WEST EUROPEAN COMPUTER SERVICES MARKETS

VOLUME 1

MARKET CHARACTERISTICS

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WEST EUROPEAN COMPUTER SERVICES MARKETS

VOLUME 1

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Prepared for:

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DECEMBER 1979

TABLE OF CONTENTS

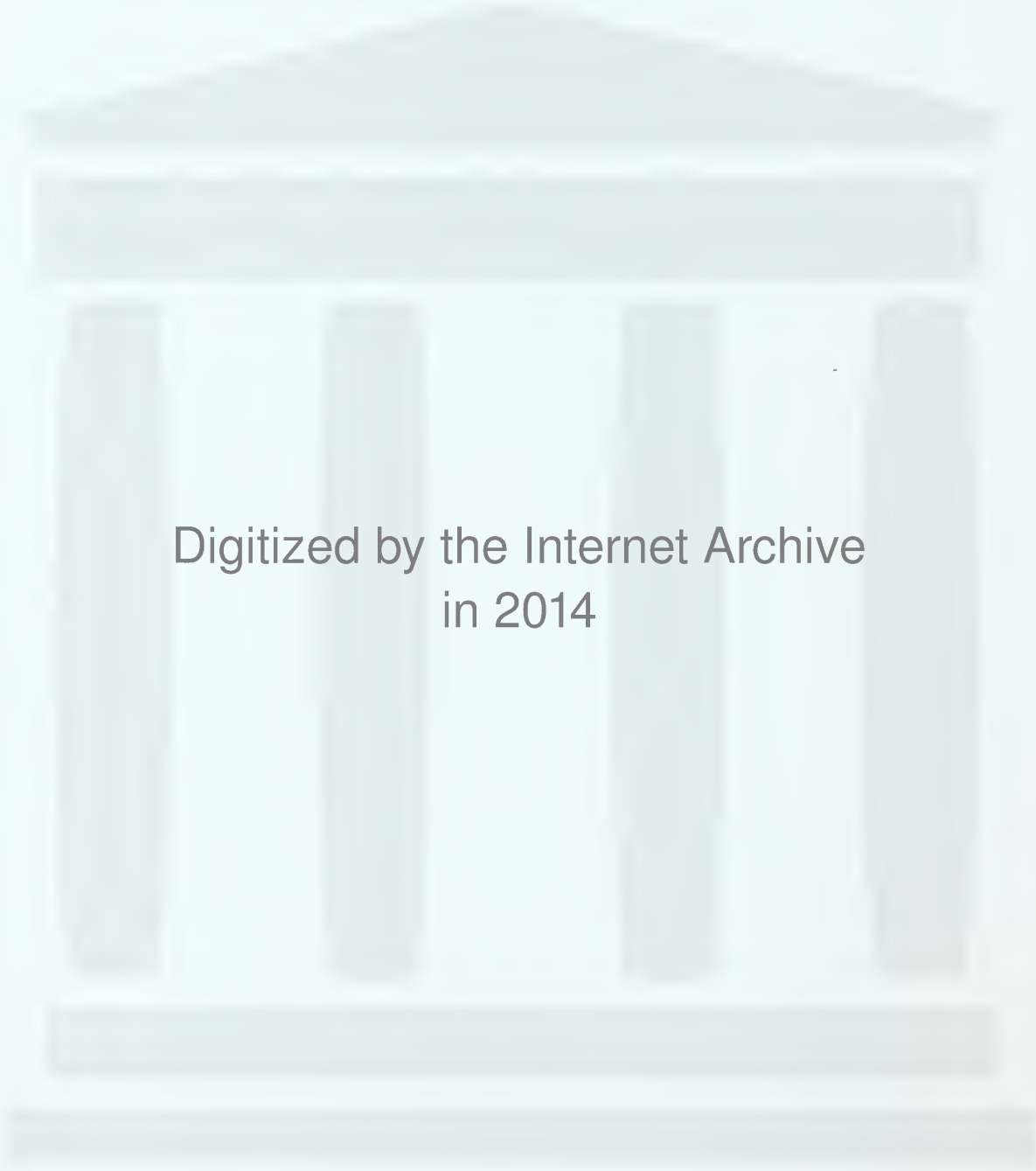


TABLE OF CONTENTS

VOLUME 1 - MARKET CHARACTERISTICS

		PAGE
I.	INTRODUCTION	1-1
II.	EXECUTIVE SUMMARY	1-3
A.	The West European Computer Services Market	1-3
B.	Major Computer Services Vendors in Europe	1-8
C.	Strategies and Recommendations	1-9
D.	Computer Services Acquisitions in Europe	1-21
III.	OVERVIEW OF THE WEST EUROPEAN MARKET	1-23
A.	The West European Market	1-23
(i)	Market Overview	1-23
(ii)	General Market Trends and Forecasts	1-30
(iii)	Vendor Revenues for RCS	1-35
(iv)	Computer Services Market Growth in the U.S.	1-41
B.	The U.K.	1-44
(i)	Geographic Description	1-44
(ii)	Economic Description	1-49
(iii)	Computer Services Market Characteristics	1-50
(iv)	Suppliers and Competition	1-56
(v)	Computer Services Market Forecast by Type of Service	1-60
C.	France	1-62
(i)	Geographic Description	1-62
(ii)	Economic Description	1-66
(iii)	Computer Services Market Characteristics	1-66
(iv)	Suppliers and Competition	1-72
(v)	Computer Services Market Forecasts by Type of Service	1-74

		PAGE
D.	West Germany	1-76
(i)	Geographic Description	1-76
(ii)	Economic Description	1-79
(iii)	Computer Services Market Characteristics	1-79
(iv)	Suppliers and Competition	1-85
(v)	Computer Services Market Forecasts by Type of Service	1-87
E.	Belgium/Luxembourg	1-89
(i)	Geographic Description	1-89
(ii)	Economic Description	1-94
(iii)	Computer Services Market Characteristics	1-97
(iv)	Suppliers and Competition	1-102
(v)	Computer Services Market Forecasts by Type of Service	1-104
F.	Netherlands	1-106
(i)	Geographic Description	1-106
(ii)	Economic Description	1-111
(iii)	Computer Services Market Characteristics	1-114
(iv)	Suppliers and Competition	1-118
(v)	Computer Services Market Forecasts by Type of Service	1-120
G.	Scandinavia	1-122
(i)	Economic Description	1-122
(ii)	Computer Services Market Characteristics	1-125
(iii)	Suppliers and Competition	1-128
(iv)	Computer Services Market Forecasts by Type of Service	1-131
H.	Other Markets	1-133
(i)	Italy	1-133
(ii)	Switzerland	1-136
(iii)	Austria	1-136

PAGE

IV. MARKET DRIVING FORCES 1-139

A. Developments in Hardware and Software 1-139

B. Pricing in the U.K. and France 1-143

(i) U.K. 1-143

(ii) France 1-144

C. Communications 1-146

(i) U.K. 1-146

(ii) France 1-150

(iii) West Germany 1-154

(iv) Belgium/Luxembourg 1-159

(v) Netherlands 1-163

(vi) Sweden/Norway 1-166

(vii) Denmark 1-170

(viii) Italy 1-170

(ix) Switzerland 1-171

(x) Austria 1-172

D. Staffing: Characteristics and Availability 1-173

(i) U.K. 1-173

(ii) West Germany 1-174

(iii) Netherlands 1-176

(iv) U.S.A. 1-180

VOLUME 2 - VENDOR ANALYSIS

V. VENDOR ANALYSIS 2-1

A. European Vendor Overview 2-1

B. Multinationals Operating in West European Countries 2-2

C. Analysis of Vendors 2-3

(i) U.K. 2-4

(ii) France 2-60

(iii) West Germany 2-116

(iv) Belgium/Luxembourg 2-154

(v) The Netherlands 2-181

(vi) Italy 2-208

PAGE

VOLUME 3 - USER ATTITUDES AND VENDOR GROWTH OPTIONS

VI. USER ATTITUDES AND REQUIREMENTS AFFECTING PRODUCT GROWTH AND DEVELOPMENTS 3-1

A. U.K. 3-6

(i) External Computing Services - Trends and Expenditure 3-7

(ii) Application Areas - Usage and Trends 3-12

B. France 3-13

(i) External Computing Services - Trends and Expenditure 3-16

(ii) Application Areas - Usage and Trends 3-18

C. West Germany 3-20

(i) External Computing Services - Trends and Expenditure 3-22

(ii) Application Areas - Usage and Trends 3-26

D. Belgium/Luxembourg 3-27

(i) External Computing Services - Trends and Expenditure 3-30

(ii) Application Areas - Usage and Trends 3-33

E. Netherlands 3-35

(i) External Computing Services - Trends and Expenditure 3-37

(ii) Application Areas - Usage and Trends 3-41

F. Sweden/Norway 3-45

(i) External Computing Services - Trends and Expenditure 3-48

(ii) Application Areas - Usage and Trends 3-52

G. U.S. Comparisons 3-54

(i) Mode of Service 3-54

(ii) Respondants' Use of Services Vendors by Industry Sector 3-57

PAGE

VII. OPPORTUNITIES AND GROWTH OPTIONS 3-58

A. Achieving Multinational Status 3-58

(i) Going it Alone 3-59
(ii) The Joint Venture 3-60
(iii) The Spin-Off Option 3-61
(iv) Merges 3-63
(v) The Acquisition Route 3-63

B. Defining an Acquisition Strategy 3-65

(i) Acquisition Strategy Definition 3-67
(ii) Acquisition Strategies in Computer Services 3-69

C. Implementing an Acquisition Strategy 3-72

(i) Self-Analysis 3-72
(ii) Environment Analysis 3-73
(iii) Prospect File Definition 3-74
(iv) Searching 3-76
(v) Screening 3-78
(vi) Approaching 3-80
(vii) Evaluating 3-82
(viii) Negotiating 3-86
(ix) Approval 3-93
(x) Post Acquisition Strategy 3-94

LIST OF EXHIBITS

LIST OF EXHIBITS

VOLUME 1			PAGE
II -	A.	Comparative European Computing Services	1-5
-	C.1	Country Market Characteristics	1-10
-	C.2	European Data Communications	1-11
-	C.3	PSTN Charges - European Comparisons	1-13
-	C.4	Leased Line Charges - European Comparisons	1-14
		. . . . .	
III -	1	Map of Western Europe	1-24
-	A.1	Market Shares Held by the Top 50 RCS Vendors	1-27
-	A.2	European Computer Services Market Forecast 1978-1982	1-29
-	A.3	Selected User Site Hardware Offerings by RCS Vendors	1-34
-	A.4	Vendor Projections of the Percentage of RCS Revenues Contributed by USHS	1-36
-	A.5	1978 RCS Revenues - Multi-National Vendors ($ Million)	1-37
-	A.6	Computer Services Market Forecasts, U.S. Available Revenues 1978-1983	1-42
-	B.1	Map of the United Kingdom with Divisions	1-48
-	B.2	Basic Economic Statistics - United Kingdom	1-50
-	B.3	Distribution of Enterprises by Size and Industry - United Kingdom	1-51
-	B.4	The United Kingdom Computer Services Market, 1978	1-53
-	B.5	The U.K./Eire Computer Services Market Sizes, 1977 and 1978	1-54
-	B.6	United Kingdom Vendor Geographical Distribution	1-55
-	B.7	The Top Ten Computing Services Vendors - United Kingdom 1978	1-59
-	B.8	The U.K./Eire Computer Services Market - Forecasts by Type of Service, 1979-1983	1-61

VOLUME 1 Continued

		PAGE
- C.1	Map of France, with Divisions	1-65
- C.2	Basic Economic Statistics - France	1-67
- C.3	Distribution of Enterprises by Size and Industry - France	1-68
- C.4	The French Computer Services Market 1978	1-70
- C.5	The French Computer Services Market Sizes, 1977 and 1978	1-71
- C.6	The Top Ten Computing Services Vendors - France, 1978	1-73
- C.7	The French Computer Services Market - Forecasts by Type of Service, 1979-1983	1-75
- D.1	Map of West Germany, with Divisions	1-78
- D.2	Basic Economic Statistics, West Germany	1-80
- D.3	Distribution of Enterprises by Size and Industry, West Germany	1-81
- D.4	The West German Computer Services Market, 1978	1-83
- D.5	The West German Computer Services Market Sizes, 1977 and 1978	1-84
- D.6	The Top Ten Computing Services Vendors - West Germany 1978/79	1-86
- D.7	The West German Computer Services Market Forecasts, by Type of Service 1979-1983	1-88
- E.1	Map of Belgium and Luxembourg with Divisions	1-93
- E.2(a)	Basic Economic Statistics - Belgium	1-95
- E.2(b)	Basic Economic Statistics - Luxembourg	1-96
- E.3	Distribution of Enterprises by Size and Industry - Belgium	1-98
- E.4	Computer Services Market, 1978 - Belgium/Luxembourg	1-100
- E.5	Belgium/Luxembourg Computer Services Market Sizes, 1977 and 1978	1-101
- E.6	Belgian Top Ten Computing Services Vendors, 1978/79	1-103
- E.7	The Belgium/Luxembourg Computer Services Market - Forecasts by Type of Service, 1979-1983	1-105
- F.1	Map of the Netherlands, with Divisions	1-110
- F.2	Basic Economic Statistics - Netherlands	1-112
- F.3	Distribution of Enterprises by Size and Industry, Netherlands	1-113
- F.4	Netherlands Computer Services Market, 1978	1-115
- F.5	The Netherlands Computer Services Market Sizes 1977 and 1978	1-116
- F.6	The Netherlands Top Ten Computing Services Vendors - 1978	1-119
- F.7	The Netherlands Computer Services Market - Forecasts by Type of Service, 1979-1983	1-121

-	G.1	Basic Economic Statistics - Scandinavia	1-123
-	G.2	Distribution of Enterprises by Size and Industry - Scandinavia	1-124
-	G.3	The Scandinavian Computer Services Market, 1978	1-126
-	G.4	The Scandinavian Computer Services Market Sizes, 1977 and 1978	1-127
-	G.5	The Top Ten Computing Services Vendors in Sweden and Denmark, 1978	1-129
-	G.6	The Scandinavian Computer Services Market - Forecasts by Type of Service, 1979-1983	1-132
-	H.1	The Top Remote Computing Services Vendors in Italy, 1978	1-134
-	H.2	The Top Remote Computing Services Vendors in Switzerland, 1978	1-137
-	H.3	The Top Remote Computing Services Vendors in Austria, 1978	1-138
		. . . . .	
IV -	C.1(a)	PSTN Charges in the United Kingdom	1-148
-	C.1(b)	United Kingdom Leased Line Charges	1-149
-	C.2(a)	PSTN Charges in France	1-152
-	C.2(b)	Leased Line Charges in France	1-154
-	C.3(a)	PSTN Charges in Germany	1-157
-	C.3(b)	Leased Line Charges in Germany	1-158
-	C.4(a)	PSTN Charges in Belgium/Luxembourg	1-160
-	C.4(b)	Leased Line Charges in Belgium and Luxembourg	1-161
-	C.5(a)	PSTN Charges in the Netherlands	1-164
-	C-5(b)	Leased Line Charges in the Netherlands	1-165
-	C.6(a)	PSTN Charges in Sweden/Norway	1-167
-	C.6(b)	Leased Line Charges in Sweden/Norway	1-169
-	D.1	Average Number of Personnel (Computer Activities)	1-175
-	D.2	Dutch D.P. Staff Salary Ranges (1978)	1-177
-	D.3	Social Security Contributions in the Netherlands	1-179

VOLUME 2

			PAGE
V -	C.1	Distribution of Sample Computer Services Companies in the U.K. by 1978 Turnover and Principal Activity	2-4
-	C.2	Distribution of Sample Computer Services Companies in France by 1978 Turnover and Principal Activity	2-60
-	C.3	Distribution of Sample Computer Services Companies in West Germany by 1978 Turnover and Principal Activity	2-116
-	C.4	Distribution of Sample Computer Services Companies in Belgium by 1978 Turnover and Principal Activity	2-154
-	C.5	Distribution of Sample Computer Services Companies in the Netherlands by 1978 Turnover and Principal Activity	2-181
-	C.6	Distribution of Sample Computer Services Companies in Italy by 1978 Turnover and Principal Activity	2-208

VOLUME 3

VI -	1	Selected User Site Hardware Offerings by RCS Vendors	3-2
-	2	Vendor Projections of the Percentage of RCS Revenues Contributed by USHS	3-4
-	A.1	User Estimates of Growth - External Services - U.K.	3-8
-	A.2	External Services Growth by Company Size: Overall Market U.K.	3-10
-	B.1	Summary of Highlights by Industry - France	3-14
-	B.2	User Estimates of Growth - External Services - France	3-17
-	B.3	External Services Growth by Company Size: Overall Market - France	3-19
-	C.1	Summary of Highlights by Industry - Germany	3-21
-	C.2	User Estimates of Growth - External Services - Germany	3-23
-	C.3	External Services Growth by Company Size: Overall Market - Germany	3-25
-	D.1	Summary of Highlights by Industry - Belgium/Luxembourg	3-28
-	D.2	User Estimates of Growth - External Services - Belgium/Luxembourg	3-31
-	D.3	External Services Growth by Company Size: Overall Market - Belgium/Luxembourg	3-32

VOLUME 3 Continued

			PAGE
-	E.1	Summary of Highlights by Industry - Netherlands	3-36
-	E.2	User Estimates of Growth - External Services - Netherlands	3-38
-	E.3	External Services Growth by Company Size: Overall Market - Netherlands	3-40
-	F.1	Usage of External Services - Norway and Sweden Compared	3-46
-	F.2	User Estimates of Growth - External Services - Norway and Sweden	3-49
-	F.3	External Services Growth by Company Size: Overall Market - Sweden and Norway	3-51
-	G.1	Average Annual Expenditures per Responding EDP Manager for Outside Services and Software in 1977 and 1978 by Category of Service	3-55
-	G.2	Anticipated Changes in Expenditure for Services by Respondent EDP Managers 1978 versus 1977 by Industry Sector	3-56

I. INTRODUCTION

I. INTRODUCTION

- This report has been prepared by Input for Datalogie in the Netherlands, and contains data which has been selected from a variety of Input's recent publications. The selected reports are:

  - MAS/EUROPE Annual Report 1979,
  - Remote Computing Services Markets in Europe,
  - Europe 5000 EDP Usage,
  - The Benelux Computer Services Market,
  - Computer Services Industry Annual Report 1979 (U.S.),
  - Computer Services Pricing in France,
  - Acquisition Strategies in Europe,
  - Timesharing Market Entry - Holland,
  - CAMP/Europe.

- A wide spectrum of information has been gathered in order to include market views not only from a vendor, but also from a user standpoint.

- The European Computer Services Market has been examined both as a single market (and as such, compared where possible, to the corresponding market in the U.S.), and on an individual country basis.

- The countries which have been the subjects of an in-depth study, are:

  - the United Kingdom,
  - France,
  - West Germany,
  - Belgium/Luxembourg,
  - the Netherlands,

and in addition, Input has included smaller markets of:

- Norway/Sweden,
- Italy,
- Switzerland,
- Austria,
- Denmark,
- Finland.

II. EXECUTIVE SUMMARY

II. EXECUTIVE SUMMARY

A. THE WEST EUROPEAN COMPUTER SERVICES MARKET

- Although the European market is comprised of a mixture of very different country markets it is still possible to identify several fundamental overall trends. These vary in degree from one country market to another.

- In total value, and when all categories of service are included, the European market is growing strongly; it grew by 22% in 1978.

- As may be expected there is some variation between the past and future potential growth of different service categories. This report concentrates on the usage, trends and growth potential of services based on the sale of computer time and classified by INPUT as "Batch Services", "Remote Batch Services" and "Interactive Services"; additionally a new category has been recently added in response to the increasing trend towards distributed processing, namely, "On Site Computing".

- The established pattern of computing services (Batch, Remote Batch and Interactive) has survived almost without change for at least a decade; over the same period there have been many changes in the surrounding world of hardware cost-performance and user inclination. In the fast moving world of computing it would be unwise not to expect, and plan for, a new generation of computing services.

- There has been a general stagnation in the advancement of software technology. The main trend in this respect has been towards heavily increasing cost and only incremental progression in performance. Basically the gulf between user and machine has been narrowed by only a negligible extent. Design, production and implementation of software is still a labour intensive activity and the difficulties are compounded by two major factors in Europe:

    i) There is currently a shortage of good quality experienced computer staff in every European country; serious doubts must be expressed that the growth in this essential component of computer system development and installation can match the expected increase in user demand.

    ii) Most application areas vary considerably in terms of detailed user, legal and fiscal requirements from country to country; furthermore users usually have a preference for a tailor made solution in spite of the cost.

- A significant trend towards de-centralised or distributed computing is now evident in all countries surveyed by INPUT in Europe. The effects on in-house computing and demand for externally supplied computing services are fundamental; both aspects of the trend are important for computing services vendors.

- Users, particularly in large organisations, are increasingly adpoting mini-computers to service the bulk of departmental needs as an alternative to using a remote and often mediocre service offered by a central data processing department. This trend, commonly classified as "Distributed Data Processing", is in INPUT's view an organisational concept which has been encouraged by the availability of relatively cheap and versatile mini- and now micro-, computers. Departmental management is beginning to find computing independance more attractive in operational terms and usually cheaper than a comparable service from the central facility.

COMPARITIVE EUROPEAN COMPUTING SERVICES

	UK	France	Germany	Belgium/Lux	Holland	Swed/Nor
SURVEY DETAIL						
Sample Percentage	49%	57%	38%	66%	40%	55%
No. of Responses	703	783	398	347	163	249
EXTERNAL SERVICES						
Usage: Overall	43%	41%	25%	33%	44%	72%
Usage: Batch	29%	30%	13%	23%	28%	53%
Usage: R. Batch	8%	5%	6%	3%	10%	23%
Usage: Interactive	16%	9%	11%	14%	20%	33%
* User Est'd Growth: Batch	-4% (+17%)	-12% (+20%)	+4% (+18%)	+1% (+18%)	-17% (+14%)	-15/-6 (+15%)
* User Est'd Growth: R. Batch	+4% (+9%)	+13% (+6%)	0% (+14%)	+14% (+12%)	-1% (+10%)	+1/+29 (+10%)
* User Est'd Growth: Interactive	+12% (+25%)	+10% (+24%)	+12% (+15%)	-11% (+24%)	+16% (+25%)	+8/+32 (+25%)
* User Est'd Growth: Combination	N/A (N/A)	+18% (N/A)	+10% (N/A)	+1% (N/A)	+31% (N/A)	+23/+39 (N/A)
INTERNAL SERVICES						
In House Usage	73%	79%	90%	82%	76%	70%
* User Est'd Growth: Batch	-4% (+17%)	-12% (+20%)	+4% (+18%)	+1% (+18%)	-17% (+14%)	-15/-6 (+15%)
* User Est'd Growth: R. Batch	+4% (+9%)	+13% (+6%)	0% (+14%)	+14% (+12%)	-1% (+10%)	+1/+29 (+10%)
* User Est'd Growth: Interactive	+12% (+25%)	+10% (+24%)	+12% (+15%)	-11% (+24%)	+16% (+25%)	+8/+32 (+25%)
* User Est'd Growth: Combination	N/A (N/A)	+18% (N/A)	+10% (N/A)	+1% (N/A)	+31% (N/A)	+23/+39 (N/A)
INTERNAL SERVICES						
In House Usage	73%	79%	90%	82%	76%	70%
User Est'd Growth: Centralised	N/A	+21%	+17%	+11%	+21%	+10/+14
User Est'd Growth: Distributed	N/A	+51%	+22%	+40%	+23%	+30/+32
APPLICATION GROWTH						
1.	FA/P	GA/P	P/I	GA/P	P/I	P/I
2.	P/I	FA/P	FA/P	FA/P	FA/P	FA/P
3.	GA/P	P/I	M/S	P/I	M/S	M/S

EXHIBIT II -A

NOTE: User estimated growth applies to a sample containing large organisations and is not representative of the overall market trend; furthermore new users growth is not included. Overall market growth figures, as estimated by INPUT are given in parenthesis.

- As a result of this user trend users will develop rapidly in direct computer experience and ability. The consequent effects on the pattern of future computer systems and services marketing are profound.

- Users have three clear alternatives in situations where they require local application and file processing facilities:

  i) Encourage the internal data processing department to convert the departmental applications for processing on a local mini-computer.

  ii) Install Turnkey systems supplied by a mini computer supplier and software/systems house partnership.

  iii) Install an On Site Computing system supplied by a services vendor.

- In terms of the conventional philosophy of data processing management the shedding of the resources and operations they control represents an erosion of their position. Considerable inertia, if not opposition, exists inside organisations now which impedes a planned and thorough implementation of functional responsibility through the distribution of data processing activities. This tendency is less prominent in France, Belgium and Luxembourg but more so elsewhere. (See Exhibit II-A).

- Users are more likely to gain their computing independence in the early phase of decentralisation through Turnkey and On Site Computing systems. Sufficient marketing and successful operating momentum must be gained by service companies before in-house d.p. departments climb onto the band wagon. Such a thrust by services vendors could permanently affect the traditional balance between in-house and externally supplied services.

- The de-centralisation trend will impact Batch Services and Remote Batch Services severely. Each will continue to have profit potential but growth prospects will tail off.

- The current user base is shrinking for Batch Services in Europe and large organisations in the countries surveyed expect a decline in their requirements.

- The market for Batch Services will become increasingly parochial and restricted in coverage to initiation of new users (small organisations generally) and load shedding by in-house installations. Consolidation of vendors which depend largely on Batch Services revenue will occur to preserve profitability. This will take the form of acquisition by RCS vendors or combination of Batch vendors to gain economies of scale. Some of the more creative vendors will diversify into mini computer based services.

- The Remote Batch Services category is least used by large organisations and they anticipate marginal growth only in most countries. This indication is in line with the overall market trend which has shown slow growth hitherto and this pattern is not expected to change for the better on the basis of the existing service definition.

- Remote Batch Services will however provide an excellent vehicle for development of On Site Computing services. In effect this will require an upgrading of the processing and file handling capabilities of existing RJE's, most probably by replacement; vendors should also press home their advantage by selling the concept of increased local user management control, peak load/large job/specialised requirement back up from the vendor's centre, and, optimisation of local, line and central costs to achieve best cost performance results.

- Interactive Services are not adversely affected by these trends since they are usually already sold directly to the end users. Indeed, the trend towards decentralisation can only help the promotion of Interactive Services which will be purchased by an increasing population of computer users with first hand knowledge.

- Interactive Services are the second most frequently used computing service and the average rate of growth will continue at 24% in Europe.

- On Site Computing services are currently establishing a foothold in the European market. The most significant impact to date has been made by on site systems created by tailor made application software.

- The growth potential revealed in INPUT's survey of large organistions for On Site Computing is at least as encouraging as for Interactive Services. However the current offerings are limited in number and inadequately promoted.

- Multi-national vendors, mainly US owned, attracted nearly half (47%) of the total European RCS revenues in 1977. The top 50 RCS vendors were collectively responsible for generating 70% of total RCS revenues.

- Production/Inventory Control and Financial Analysis Planning are the best application areas for growth over the next two years. They are also relatively international in their potential usage as a standard package and represent a good investment potential when associated with new products and services.

B. MAJOR COMPUTER SERVICES VENDORS IN EUROPE

- An analysis of the major European computer services vendors produces the following order of company size:

1.	IBM	11.	Datacentralen
2.	CAP Gemini Sogeti	12.	GEISCO
3.	CISI	13.	Mannesmann
4.	Kommunedata	14.	SPADAB
5.	GSI	15.	Telesysteme
6.	Sema/Metra	16.	CCMC
7.	SG2/Telsys	17.	ICL/Dataskil
8.	Sligos	18.	TSIL (Thomson Group)
9.	Datema	19.	Scicon
10.	Datev	20.	BOC Datasolve.

- It should be noted that the above cover the total range of computer services (batch, remote batch, software and professional services) and the ranking is based on total sales, irrespective of which service(s) is/are actually offered by individual companies.

C. STRATEGIES AND RECOMMENDATIONS

(i) EUROPE

- In terms of European opportunities, only five markets are worth attention: France, Germany, and the U.K. because of their size, and Belgium and the Netherlands because of their growth and side attractions (international operations, multilingual staff available, tax facilities, etc.).

- End-user pricing considerations are a vital part of any market plan but particularly so in Europe. Typically, a paycheck in the U.K. costs $.03; in Switzerland $.25, and in Germany anywhere from $.25 to $.35. Countries that command high prices (Sweden, Germany, Switzerland) also tend to demand higher salaries, accommodation costs, telecommunications costs, etc. The main characteristics and tariffs are summarized in Exhibits II-C.1, 2, 3 and 4.

- Each country in Europe must be approached with a particular subset of the basic technology, applications and know-how of the vendor, ideally developing local-need applications satisfied by locally developed packages. This cannot be stressed enough in a market where application packages do not travel well across country borders because of differing national end-user requirements.

- For this reason, it is frequently necessary to deliberately adopt an open-minded strategy regarding how a national market should be approached. The strategy should be planned with the total involvement of the national manager hired for that job. There can be clear marketing goals established as to the technology or basic products to be offered; the means and methodology of applying them, however, should be left open for local tailoring.

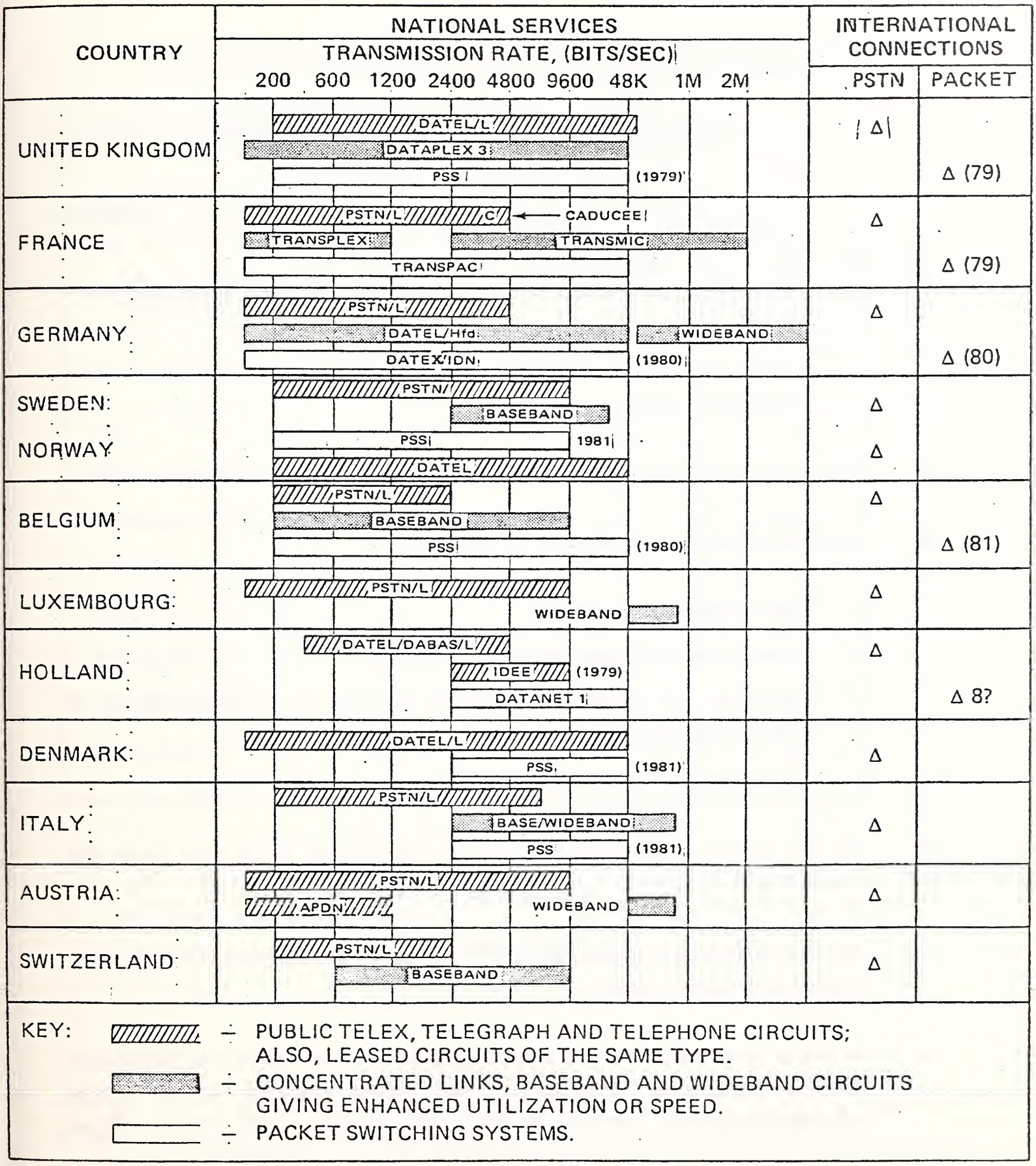
EXHIBIT II-C.1

COUNTRY MARKET CHARACTERISTICS

RANK	COUNTRY	RCS MARKET SIZE	END USER PRICING	ACCOMMODATION/ STAFF COSTS	COMMUNICATIONS		
					AVAIL-ABILITY	COST	QUALITY
1	UNITED KINGDOM	●	○	○	●	○	●
2	FRANCE	●	◒	◒	◒	◒	◒
3	GERMANY	◒	●	●	●	●	●
4	SWEDEN	○	●	●	◒	○	●
5	NETHERLANDS	○	◒	◒	◒	◒	◒
6	BELGIUM	○	◒	◒	◒	◒	◒
7	DENMARK	○	◒	◒	●	◒	◒
8	LUXEMBOURG	○	◒	◒	◒	○	◒

LEGEND: ● VERY HIGH ◒ HIGH ○ MEDIUM ○ LOW

EUROPEAN DATA COMMUNICATIONS



KEY:
- = PUBLIC TELEX, TELEGRAPH AND TELEPHONE CIRCUITS; ALSO, LEASED CIRCUITS OF THE SAME TYPE.
- = CONCENTRATED LINKS, BASEBAND AND WIDEBAND CIRCUITS GIVING ENHANCED UTILIZATION OR SPEED.
- = PACKET SWITCHING SYSTEMS.

- Large organisations form the best target area for RCS services since:
  - experienced and knowledgeable users are easier to sell to and work with,
  - each unit of marketing effort usually brings a higher return in business gained,
  - large scale contracts incur fewer administrative and operational overheads,
  - usage of external services (particularly Interactive Services) is more frequent in large organisations.
- A large account strategy is still a viable approach although penetration is low.
- Increased penetration is possible by addition of:
  - new categories of service,
  - industry specific application products,
  - products and services which allow the user an increased degree of computing autonomy,
  - database and network services.
- All are product dependant; products in this context being both tools and applications.
- Services marketing is more easily organised and usually, more effective, on a product and industry basis.
- In future generations of RCS systems, central (vendor based) and distributed hardware, distributed databases and the network resources will be jointly planned to achieve optimum balance of loads and costs. Users will have access to a hierarchical system whose operation will be transparent and will appear to be controlled and to function locally. This will change the traditional discrete service (Remote Batch, Interactive etc.) approach into a multi mode delivery, application based and user controlled service.

PSTN CHARGES - EUROPEAN COMPARISONS

COUNTRY	CHARGES ($)		
	LINE (i) INSTALLATION	LINE (ii) RENTAL/YR	PEAK (iii) RATE/HR
UK	88	72	7
FRANCE	186	102	14
GERMANY	200	162	24
SWEDEN	79	54	5
NORWAY	196	92	13
BELGIUM	155	440	3
LUXEMBOURG	82	247	2
HOLLAND	104	136	6

(i) IF RANGE, MEAN QUOTED

(ii) 50 - 100 km

(iii) ALL FIGURES, NEAREST WHOLE NUMBER.

EXHIBIT II-C.3

LEASED LINE CHARGES - EUROPEAN COMPARISONS

COUNTRY	CHARGES ($) (i)	
	CONNECT (ii)	LINE RENT/YR (iii)
UK	118	1868
FRANCE	186	7624
GERMANY	200	12000
SWEDEN	207	1880
NORWAY	196	2470
BELGIUM	165	3210
LUXEMBOURG	165	1640
HOLLAND	162	2837

(i) DISTANCE OF 50 km

(ii) STANDARD QUALITY / 2400 bps / DUPLEX

(iii) MEAN TAKEN IF RANGE PRICES

EXHIBIT II-C.4

- A vital element in the strategy of RCS vendors must be in the area of recruitment and development of staff and minimisation of staff losses through good career and personnel management.

- A large slice of research and development funds should be devoted to the development of less labour intensive methods for application system implementation. This particular R & D route is littered with technical and economic failures; but the constraints on growth imposed by availability of staff make it essential that practical and cheap solutions are found.

- In terms of the conventional philosophy of data processing management the shedding of the resources and operations they control represents an erosion of their position. Considerable inertia, if not opposition, resides within internal DP organisations, and this now impedes a planned and thorough implementation of functional responsibility through the distribution of data processing activities.

- This tendency makes particular demands on vendor marketing style and methods. The two basic choices are:

  a) ignore the DP manager and sell direct to user department, or,

  b) educate the DP manager in his evolving role and develop him as a partner.

- In the longer-term, the second solution must be preferred, for two important reasons:

  - the evolution of the DP manager's own career structure is tending to place him on a par with the other general managers in a company, but parity will not be fully achieved until a quid pro quo has been negotiated, namely a loosening of centralised control on a functional distributed basis in return for acceptance into the club of general management,

  - the larger business DP systems cannot be implemented on a departmental basis.

- The increasing use of the database approach provides the clean interface between end-user and DP department.

  - DP department responsible for supply and upkeep of the databases,
  - User department responsible for the usage of the database resource.

- However, in the short-term direct selling is still required for specific applications and in specific situations.

(ii) U.K.

- The U.K. offers strong attractions to a prospective vendor of remote computing services with a very strong market demand for such services (both interactive and remote batch with greater demand for interactive).

- Financial services, in the broad sense, absorb the largest proportion of the RCS market.

- Telephone communications within the U.K., while not on a par with the U.S. or Germany, are adequate; line quality is good and costs are reasonable.

- Market education as to what benefits can be achieved from RCS has been largely achieved at the large U.K. company level. Marketing needs to convince prospects of the economic value of the service, rather than explain what RCS is. At the establishment level, however, there is a penchant for the small in-house system.

- A minor, but by no means negligible, factor is that U.K. nationals rarely speak any foreign languages. This is a serious drawback in negotiating business on the continent.

(iii) FRANCE

- France is the prime RCS market in Europe and as such merits attention despite the difficulties facing a U.S. entrant. Establishing a Paris headquarters is no easy task. Buying into the market via the acquisition of an established French company is far more effective.

- The French like to deal at the highest levels (President, Vice President) of an organization, and with Frenchmen. Better still, if these same people are personal friends, the business opportunities are far greater. One step down from this is the "school tie" syndrome where alumni of say, l'Ecole Polytechniques or HEC, etc., even though perfect strangers, will prefer to deal with each other rather than with someone from another school.

- In this environment, establishing a Paris office staffed by foreigners is commercial suicide. An optional approach is that taken by McAUTO, Tymshare, and others who jointly funded, with an established well-known French company of similar nature to themselves, the development of existing operations.

- French nationals are nearly as insular as their U.K. counterparts. (The foreign language ability of the average Frenchman usually limites him to France and Belgium).

- RCS competition is very strong in France, but the market is expanding rapidly enough to accommodate further vendors, particularly in financial applications for which there is an increasing demand.

(iv) WEST GERMANY

- There is no question that the potential of the West German RCS market outweighs all other European markets. To date, this potential has not materialized due to:

  - The availability and variety of local batch services.
  - The successful drive of the domestic (and foreign) vendors of the small in-house computer and office computer.
  - The high cost of communications.

- RCS competition is not formidable as yet in Germany. Vendors of broadly applicable financial applications have had some success, but not on the scale of the batch vendors. The demand for financial packages is high, however.

- Due to the distributed nature of the customer base (spread over 13 major city centers in all), local provision of services means restricted market coverage. Remote batch services, for this reason, hold the greater promise since they can build on existing batch services while taking advantage of the concentration of workload created by the use of a network.

- Prices for services of all categories in Germany are on a par with Sweden's - the highest in Europe. This situation creates opportunities for RCS where the processing centres are based in a cheaper country. (The IBM supercentre in the U.K., destined to service the whole of Europe, is an example.)

- If a remote batch marketing plan could be found that took advantage of the huge installed base of small computers (offering financial consolidation services to decentralized establishments), this could provide significant potential.

(v) BELGIUM/LUXEMBOURG

- The Belgium market, in itself, certainly does not offer adequate motivation for locating offices in Brussels. The main attraction is the high number of international companies which have their headquarters in the city and who can be used as the leverage point for important international contacts.

- Brussels is also strategically placed with respect to the Netherlands, Paris (the largest slice of the French market), the Ruhr-Gebiet (the largest share of the German market), and is within striking distance of Copenhagen, London, Stockholm and Oslo.

- Modern office accommodation and well-educated EDP staff are available in Brussels to an extent not easily duplicated elsewhere. The "basic materials" for the creation of a high quality European operation are, therefore, available.

- The national company tax laws are not over restrictive on the movement of capital. This enables flexible financial transactions and profit repatriation from subsidiaries.

- Belgium nationals are frequently bi-lingual and sometimes tri-lingual. Flemish is equivalent to Dutch and is easily understood by the latter and, to some extent, by the Germans. French, the other Belgium national language, provides the link with France, of course.

(vi) NETHERLANDS

- As with Belgium, barring acquisition, the Dutch market is too small to allow new entrants a reasonable chance of success. All of the major prospects have been identified long ago and are regularly visited by the existing RCS vendors.

- For tax reasons, for the flexibility offered by Dutch staff (who frequently speak four languages - English, French, German, and Dutch - which is also understood by the Flemish part of Belgium) and for the tax rules applying to the movement of capital into and out of the country, the Netherlands can be a useful base of European operations, once they have grown to international proportions. As such, a holding company in Holland makes sense, even if straight market entry does not.

- The very low cost of telecommunications and the central location of the Netherlands with respect to large regions such as the Ruhr-Gebiet (Germany) has encouraged General Electric to locate its supercentre in the Netherlands. A circle of 400 miles around Amsterdam covers all of West Germany, most of England and Scotland, Berne, Paris, Belgium, and Luxembourg.

(vii) SWEDEN/NORWAY

- The Swedish market is an attractive one, but extremely difficult to penetrate. Established vendors already provide a broad array of services and are aggressive competitors.

- The existence of heavily financed, strong RCS suppliers like SPADAB, DATEMA, and DAFA in the remote batch market preclude the overnight creation of a foreign source of services.

- Sweden is a viable centre for operations aimed at the Scandinavian market (Finland, Norway, Denmark, and Sweden), being situated in the geographical centre of that market and armed with excellent quality (and reasonable priced) telecommunications.

- This approach has already been adopted by a number of computer services vendors in the Scandinavian market with good success.

- The Swedes are frequently multi-lingual, particularly with regard to the Scandinavian market, and consider the English language a second tongue. (There are several Swedish newspapers that provide English language editions.)

D. COMPUTER SERVICES ACQUISITIONS IN EUROPE

- Acquisition activity did not become a significant factor in the development of the computer services industry in Europe until the early 1970's.

- The largest services companies outside the USA are mainly French; the top three being GSI, CISI and CAP/Sogeti/Gemini. Acquisitions in France and other European countries are a key factor in this achievement which may not have been possible without the considerable support received from the French banks and government.

- After the French services companies, American services companies have been the next most successful, particularly in terms of the size of the companies acquired. They have been noticeably successful in the United Kingdom; however, in contrast, American services companies have been relatively unsuccessful in France.

- Some British services companies have become very large in their home market by acquisition but their acquisition success has rarely extended into other European countries.

- The most successful companies in acquisition making have benefitted from the twin advantages of a well developed home market and adequate supportive financial backing. Each company (US and European alike) has first established itself as a major force in its home market and afterwards acquired a presence in additional countries; additional countries are usually defined as neighbouring and/or large European country markets followed by the US market. The French services companies are currently furthest along this progression.

- The frequency of acquisitions in the computer services industry in Europe will accelerate; some constraints on this forecast could, however, be imposed by government legislation and PTT policies. In a rapidly expanding market and with a corresponding growth in number and size the sometimes quoted "lack of acquisition candidates" will not be a constraint.

III. OVERVIEW OF THE WEST EUROPEAN MARKET

III. OVERVIEW OF THE WEST EUROPEAN MARKET

A. THE WEST EUROPEAN MARKET

- For the purpose of this Report, the major countries of Western Europe have been studied, as described in Section I. Exhibit III-1 shows the Continent of Europe, with the countries under survey shaded.

(i) MARKET OVERVIEW

- The European market is a heterogeneous mixture of unlike markets, environments, competitors, prices and practices. The only aspect that doesn't vary too widely is the user's needs, although the emerging awareness of these can occur with a two to three year delay from one country market to the next. Nevertheless, some general trends are apparent in the European market as a whole.

- In comparison, the US market is relatively homogeneous; inter-state boundaries do not have the partitioning effect that national boundaries do in Western Europe. The US market is also more than twice the size of its European counterpart - in 1977 the respective market totals for computer services revenues were $7 billion and $3 billion.

- Overall the total European market grew in value by 22% between 1977 and 1978. In the Remote Computing Services (RCS) sector, growth varied considerably between Interactive Services (25%) and Remote Batch Services (18%).

WESTERN EUROPE

EXHIBIT III-1

- France continued to be the largest market for computer services in total and for all but one service category. The UK market for Interactive Services is marginally larger.

- An increasing load of time critical applications is driving the expansion of the interactive market (and the development of the software related thereto).

  - Remote batch is not as attractive a user alternative and is growing at a slower rate.

  - A further development, on-site minicomputers connected to a network for off-loading peak work demands, will not change this picture from the remote batch services standpoint. Users are indicating their requirement for immediate on-line processing not the deferred processing inherent in remote batch.

- There is increasing justification for creating a third category within the RCS market: User Site Hardware Services (USHS) or the mixed use of programmable hardware for local data processing plus telecommunications access to the RCS vendor's host computer. RCS vendors market the total system, and as a by-product move into the Turnkey Systems sector.

- Meanwhile for comparison the professional services and software products market is booming at 27% growth overall (in 1976/77), ranging as high as 32%. This is where much of the industry's new talent is being absorbed, particularly with the explosion of Turnkey minicomputers from all sources, including IBM.

- As an order-of-magnitude, the European computer services industry employs around 217,000 people, each producing, on average, $25,000 in revenues. Allowing for an average annual increase of prices of 5%, by 1982 these same people should be producing $30,000 each. By the same token there will have to be 354,000 of them, an increase of 63% over 1978 and an annual increase of staff in the industry of 13%. Actual inflation rates vary widely from country to country, and price changes will vary also from the 5% figure mentioned above.

- This is the crucial factor in all of the vendor growth plans - finding (and keeping) the right people. Already in Europe there is a shortage of good staff. Where will this extra 137,000 people come from? This is a key question for managements to address.

- Each country in Europe must be approached with a particular subset of the basic technology, applications and know-how of the vendor, ideally developing local-need applications satisfied by locally developed packages. This cannot be stressed enough in a market where application packages do not travel well across country borders (nothing to do with language barriers). Generally, European users prefer a tailor made approach which meets their needs precisely instead of a generalised and cheaper standard system.

- For this reason, it is frequently necessary to deliberately adopt an open minded strategy regarding how a national market should be approached. The strategy should be planned with the total involvement of the national manager hired for that job. There can be clear marketing goals established as to the technology or basic products to be offered; the names and methodology of applying them, however, should be left open for local tailoring. The following paragraphs illustrate the diversity of the major country market characteristics.

- FRANCE has the largest services vendors in Europe (GSI, CISI, CAP/Sogeti and SLIGOS for example) many of whom have developed with outstanding aid and encouragement from government and banks. The government is also defensive in its restriction on the operations of foreign competiton. The market is progressive in adopting new trends and currently shows the most expansive intention in the direction of de-centralised computing. 75% of all business is done in the greater Paris area.

MARKET SHARES HELD BY THE TOP 50 RCS VENDORS

COUNTRY	US MULTINATIONAL		EURO MULTINATIONAL		NATIONAL	
	$M	%'ge	$M	%'ge	$M	%'ge
FRANCE	49.30	25	101.82	52	25.70	13
GERMANY	34.84	31	13.11	12	48.50	43
U.K.	86.99	53	22.84	14	42.90	43
ITALY	27.20	59	0.00	0	13.20	29
SWEDEN	9.63	11	3.50	4	36.11	42
HOLLAND	26.97	43	0.60	1	13.95	22
DENMARK	10.60	28	2.70	7	22.38	59
BELGIUM	23.97	44	4.02	7	2.70	5
OTHERS	10.40	11	0.20	+	N/A	N/A
W. EUROPE	279.90	33	148.79	17	205.66	24

+ = SMALL VALUE

EXHIBIT III-A.1

- GERMANY has the greatest number of service companies (more than 1000 of all types); no consolidation into larger units has taken place due to the absence of any harsh economic factors and the distributed geographic nature of the market. The latter factor is also responsible for the concentration of bureau business in Batch services, combined with the extremely high cost of data transmission lines. The market is IBM dominated both for the supply of in-house equipment and external computing services.

- The UNITED KINGDOM is probably the most attractive European market due to large market size, low operating costs and good availability of cost effective data transmission services. The Post Office is progressive in its development of new computer related services which include packet switching and the Prestel/Viewdata information service. These factors have assisted the present high level of development of the RCS market and will go on doing so.

- BELGIUM/LUXEMBOURG is unique in Europe for the extreme tendency by industrial and commercial organisations to contain the maximum proportion of activities in-house. Consequently it is the smallest market for computer services in Europe relative to the total amount of computing being performed.

- HOLLAND is a very competitive market due to the presence of a large number of international and some strong national vendors each directing their efforts towards a fairly limited number of prospects; most of them are located in a relatively small geographic area bounded by the cities of Amsterdam, Rotterdam and Utrecht. It is an attractive market for the RCS vendor due to the cheapness of data transmission lines, but also more generally because of the central geographic location and the open minded and international inclination of the Dutch business community.

- The multi-national vendors in 1978 (see Exhibit III-A.1) attracted half of the total European RCS market revenues.

COUNTRY	1978 ($ MILLIONS)x					1982 ($ MILLIONS)+					AVERAGE ANNUAL GROWTH RATE (%) 1978 - 1982				
	RCS		Batch	Other*	Total	RCS		Batch	Other*	Total	RCS		Batch	Other*	Total
	IA**	RB**				IA**	RB**				IA**	RB**			
FRANCE	82	198	631	355	1266	194	250	1308	867	2619	24	6	20	25	20
GERMANY	28	139	505	264	936	49	235	962	340	1586	15	14	18	7	14
UK	86	102	270	248	706	210	144	506	605	1465	25	9	17	25	20
ITALY	24	35	297	194	550	30	39	576	376	1021	6	3	18	18	17
SWEDEN	34	82	240	139	495	83	120	420	339	962	25	10	15	25	18
HOLLAND	25	55	142	97	319	61	81	240	229	611	25	10	14	24	18
DENMARK	11	34	138	81	264	27	50	241	198	516	25	10	15	25	18
BELGIUM	25	37	84	61	207	59	58	163	159	439	24	12	18	27	21
OTHERS *	69	196	270	170	705	179	247	598	415	1439	27	6	22	25	20
ALL	384	878	2577	1609	5448	892	1224	5014	3528	10658	23	9	18	21	18

* Software Products, Turnkey Systems and Professional Services

** IA - Interactive, RB - Remote Batch

\+ 1982 dollars are expressed as "Constant" in that no inflation factor is applied: "Current" 1982 dollars will be higher, depending on the inflation rate, competitive environment, and product mix in each individual country.

x Captive Revenues are excluded; exchange Rates used for $1: 4.74 French Francs, 2.11 Deutsche Marks, 0.51 Pounds Sterling, 824 Lire, 4.65 Swedish Krone, 2.27 Guilders, 32.70 Belgian Francs, 5.25 Danish Krone.

* OTHERS refers to Norway, Finland, Austria, Switzerland, Spain and Portugal.

EXHIBIT III-A.2

- Multi-national companies are particularly strong in the UK, Belgium and France where they have more than 60% of the total revenues in those countries. Indigenous national vendor competition is much stronger in the Scandinavian countries.

- The top 50 RCS vendors in Europe are collectively responsible for 70% of total revenues.

(ii) GENERAL MARKET TRENDS AND FORECASTS 1978 - 1983

- In 1977 the Western European computer services market topped $3 billion for the first time and was growing at an overall rate of 21% per annum. In 1978 the market grew at 22% to achieve a total value of $5.43 billion.

- While growth is expected to slow slightly over the 1978 - 82 period the market will nevertheless double in size reaching $7.2 billion by 1982 as shown in Exhibit III-A.2. The figures are in 'constant' 1978 dollars because of the widely differing inflation rates in each country. Actual growth in the period will be higher than the 18% rate shown.

- As already stated, it may become necessary during the forecast period to re-define the service elements which make up RCS. For the meantime the conventional labels are retained for convenient reference.

- During the forecast period large organisations (greater than £20 M annual revenue) will continue to provide most of the RCS business. (For this reason many of the market figures given in this report are quoted from INPUT research in the large organisation sector of the market).

Remote Batch Services

- Of all computing services categories Remote Batch Services is the least frequently used. In most Western European countries the proportion of large organisation users ranges from 3% to 10%; only in Sweden and Norway does this proportion reach 23%. In comparison, Interactive Services are used by two to four times the number of large organisations and Batch Services two to six times the number.

- Until now the Remote Batch Services market has shown slow growth: overall, 9% per annum. This pattern is unlikely to change unless these services are developed in response to the trend towards distributed computing - thus the forecast remains static at 9%.

- In some European countries (France, Belgium and Norway excluded) Remote Batch Services are vulnerable to in-house processing. The market will be found to be more productive in the medium size organisation category and will account for 11% of the total computer services markets.

- Growth prospects will be enhanced if Remote Batch Services are developed to enable more processing to be carried out on the users' site.

Interactive Services

- Users of Interactive Services form the second highest proportion of conventional external computing services usage. In market value terms, however, Interactive Services will account for 8% of the total computer services market.

- This category of service is the fastest growing of the conventional external computing services. The average rate of growth in Western Europe will continue at the current high level of 23% per annum.

- The mainstream applications for Interactive Services are engineering, scientific and business planning computation. Some vendors are experiencing a growth in revenue of 40% to 50% per annum.

- The trend in vendor competition is towards establishment of market domains through specialisation; direct conflict between vendors is thereby reduced.

User Site Hardware Services

- To date INPUT has not conducted specific research on USHS in Europe, although overlapping user and vendor research indicates that growth potential is at least as high as for Interactive Services.

Batch Services

- Reference must be made to Batch Services since any migration away from these will affect demand for RCS which in its USHS form offers one alternative.

- Although overall growth is 17% there is evidence that the large organisation sector of the market will grow at only half of this rate. Indeed in some countries, notably U.K., France, Holland, Sweden and Norway, existing users are anticipating a decline in their demand.

- Vendors will have to work hard to generate new users for Batch Services to achieve the forecast growth rate.

- The main rivals for Batch Services are the mini computer based Turnkey Systems and USHS. These are price competitive and offer the additional attractions of increased user control and rapid turn round.

- Constant erosion of hardware prices increases the competitive advantage of turnkey systems whereas Batch Services vendors are not experiencing any significant reductions in their operating costs, more probably the opposite.

- Batch Services which are manpower dependant and connected with special expertise included in the vendor service are less vulnerable.

1. Evolution of a New Remote Computing Service

- This relatively new category of external computing service is currently establishing a foothold in the market. The proportion of users is small in large organisations and probably negligible in medium and small organisations.

- Growth prospects are at least as encouraging as for Interactive Services and in some countries exceed these by a factor of at least two (Germany, Holland and Sweden). Although this growth is on a smaller market value the incremental revenue for each new contract is much higher.

- User Site Hardware Services (USHS) are currently dedicated to a single or very restricted number of applications. Multiple or clustered configurations are as yet unheard of.

- Facilities Management could experience a renaissance if offered with User Site Services since end users will require more support than previous targets for the FM service.

- Some vendors are already acquiring software houses in order to provide the turnkey service necessary to install User Site systems. This is also an insurance against any unexpected fall off of demand for mainframe support.

- User Site systems will be found to be a good vehicle for OEM operations. Service companies are likely to become more hardware orientated as end user demands bite.

- DDP and USHS can be seen as alternative modes of supply for the same user facility. Neither is permanently labelled 'in-house' or 'external service' territory. Essentially there is a unique opportunity to change the balance of internal computing facilities and external computer services.

SELECTED USER SITE HARDWARE OFFERINGS BY RCS VENDORS

VENDOR	PRODUCT	HARDWARE	BUNDLED WITH SERVICE	PRICE RANGE	LEASE OR PURCHASE	NUMBER OF PORTS	SIZE OF MEMORY	SIZE OF DISK STORAGE
ADP NETWORK SERVICES	"ONSITE"	DEC 2020	YES	$5-15,000 PER MONTH	LEASE ONLY	8-32	1-2+ MB	45-300+ MB
NCSS	"3200"	TWO PI 3200	NO	$185,000 TO $800,000	PURCHASE ONLY	1-32	0.25-MB	200-2000 MB
ITEL*	SMALL BUSINESS STANDALONE	DG CS SERIES	YES	$15,000 TO $100,000+	LEASE AND PURCHASE	AS APPROPRIATE TO THE APPLICATION		
KEYDATA*	"UNITY" SMALL BUSI-NESS STAND-ALONE	DG NOVA 3/D	YES	$48,000 TO $100,000+	PURCHASE AND MONTHLY SOFTWARE FEE	AS APPROPRIATE TO THE APPLICATION		
GE	"MARKLINK"	TI MINI	YES	$21,230 TO $93,290 OR $800 TO $3,690 PER MONTH	LEASE AND PURCHASE	1-16	24-352	10-20
STSC	"QUAD 100"	NOT YET SELECTED	NO	$500,000 TO $1,000,000	PURCHASE ONLY	5-16	1+ MB	UNANN-OUNCED
TYMSHARE COMPUSERVE, RAPIDATA	NOT FOR-MALLY ANNOUNCED	DEC 2020	UNKNOWN, BUT PRESUMED SIMILAR IN PRICE AND CAPABILITY TO ADP'S "ONSITE"					

* ARE NOT INTEGRATED WITH A NETWORK AND THEREFORE ARE NOT CONSIDERED USHS AND ARE NOT INCLUDED IN THE FORECASTS OF USHS DEVELOPED IN THIS STUDY: THEY ARE SHOWN ON THIS CHART FOR COMPARISON ONLY.

EXHIBIT III-A.3

2. Products and Services Available

- The vendor offerings in the USHS category are relatively limited currently. Exhibit III-A.3 summarises the more prominent services currently offered or planned to be offered by nine vendors; all are US owned vendors of which only six are marketing USHS actively in the USA and only one (ADP) in Europe.

- In Europe USHS services and products are more likely to develop from tailor made remote systems which originate from either enhanced RJE systems or turnkey systems. Standard products will evolve subsequently. European vendors such as UCSL, Scicon, CISI, SLIGOS, CEA and others are developing their 'On-Site Services' along these lines.

- Significant revenues from USHS will not be generated in the European market during the next three years by either the US or indigenous vendors. Exhibit III-A.4 summarises the revenue percentage projections by US vendors in the US market. In the European market the build up is likely to be at a similar pace. (Specific research on this subject has been completed by INPUT in the USA).

(iii) VENDOR REVENUES FOR RCS

- Exhibit III-A.5 shows 1978 revenues ($ millions) achieved by 16 multi-national RCS vendors in Europe. They are classified as 'multinational' because they have at least $100,000 of revenue in more than one European country.

- The multi-national vendors attracted nearly half (47%) of the total European RCS market revenues.

- Multi-national companies are particularly strong in the U.K., Belgium and France; in each of these countries they have more than 60% of the total revenues in those countries.

VENDOR PROJECTIONS OF THE PERCENTAGE OF RCS REVENUES CONTRIBUTED BY USHS

VENDOR	PERCENT OF RCS REVENUES DERIVED FROM USHS			
	1978	1979	1980	1983
1	0%	5%	7.5%	10.0%
2	0	0	0	15-20.0
3	0	0	5.0	20.0
4	MINIMAL	10	20.0	25.0
5	MINIMAL	3	5.0	15-20.0
6	0	2	5.0	20.0
AVERAGE	1%	4%	7.0%	18.3%

EXHIBIT III-A.4

1978 RCS REVENUES - MULTI NATIONAL VENDORS
($ MILLION)

RCS VENDOR	FRANCE	GERMANY	UK	ITALY	SWEDEN	HOLLAND	DENMARK	BELGIUM	OTHER	TOTAL
IBM*	22.50	19.00	17.20	15.20	4.67	10.00	4.10	8.60	3.40	104.67
GEIS*	14.50	6.70	23.00	6.10	2.65	6.30	4.80	6.90	5.30	76.25
CISI	46.00	-	8.90	-	-	-	-	0.72	-	55.62
SLIGOS	30.50	5.00	-	-	-	-	-	3.15	-	38.65
CDC*	4.70	4.00	5.10	4.50	2.31	5.20	1.70	3.90	1.70	33.11
GSI	25.20	1.25	5.30							31.75
COMSHARE			17.00			1.10		0.86		18.96
ADP*		1.30	9.30	1.40		2.70		0.90		15.60
UCC		4.10	5.60			1.20		1.80		12.70
TYMSHARE	7.60	2.50	1.30					0.70		12.10
ATKINS-O.L.			8.25			0.25				8.50
DATEMA*		0.60			3.50	0.10	2.70		0.20	7.10
SCICON			6.60			0.10				6.70
MBP	0.12	3.10								3.22
CMG		0.16	2.04			0.5		0.16		2.86
CSC*		0.24	0.24			0.12		0.30		0.90
TOTAL	151.12	47.95	109.83	27.20	13.13	27.57	13.30	27.99	10.60	428.69
MARKET	195.0	113.00	165.00	46.00	86.00	62.00	38.00	55.00	92.00	852.00

* INPUT ESTIMATE

EXHIBIT III-A.5

- Conversely indigenous national vendor competition is stronger in the Scandinavian countries; here the dominance is reversed and is represented by a revenue proportion of, for example, 80% in Sweden.

- The top 50 RCS vendors in Europe (multi-national and national) are collectively responsible for generating 70% of total market revenue.

- Each country in Europe must be approached with a particular subset of the basic technology, applications and know-how of the vendor, ideally developing local-need applications satisfied by locally developed packages. This cannot be stressed enough in a market where application packages do not travel well across country borders because of differing national end-user requirements.

- For this reason, it is frequently necessary to deliberately adopt an open-minded strategy regarding how a national market should be approached. The strategy should be planned with the total involvement of the national manager hired for that job. There can be clear marketing goals established as to the technology or basic products to be offered; the names and methodology of applying them, however, should be left open for local tailoring.

- Large organisations form the best target area for RCS services since:

  - experienced and knowledgeable users are easier to sell to and work with,
  - each unit of marketing effort usually brings a higher return in business gained,
  - large scale contracts incur fewer administrative and operational overheads,
  - usage of external services (particularly Interactive Services) is more frequent in large organisations.

- A large account strategy is still a viable approach although penetration is low.

- Increased penetration is possible by addition of:
  - new categories of service,
  - industry specific application products,
  - products and services which allow the user an increased degree of computing autonomy,
  - database and network services.
- All are product dependant; products in this context being both tools and applications.
- Services marketing is more easily organised and usually, more effective, on a product and industry basis.
- The established pattern of providing processing services (Batch, Remote Batch and Interactive) has survived almost without change for at lease a decade; over the same period there have been many changes in the surrounding world of hardware cost-performance and user inclination. In the fast moving world of computing it would be unwise not to expect, and plan for, a new generation of computing services.
- A vital element in the strategy of RCS vendors must be in the area of recruitment and development of staff and minimisation of staff losses through good career and personnel management.
- A large slice of research and development funds should be devoted to the development of less labour intensive methods for application system implementation. This particular R & D route is littered with technical and economic failures; but the constraints on growth imposed by availability of staff make it essential that practical and cheap solutions are found.

- In terms of the conventional philosophy of data processing management the shedding of the resources and operations they control represents an erosion of their position. Considerable inertia, if not opposition, resides within internal DP organisations, and this now impedes a planned and thorough implementation of functional responsibility through the distribution of data processing activities.

- This tendency makes particular demands on vendor marketing style and methods. The two basic choices are:

  a) ignore the DP manager and sell direct to user department, or,

  b) educate the DP manager in his evolving role and develop him as a partner.

- In the longer-term, the second solution must be preferred, for two important reasons:

  - the evolution of the DP manager's own career structure is tending to place him on a par with the other general managers in a company, but parity will not be fully achieved until a quid pro quo has been negotiated, namely a loosening of centralised control on a functional distributed basis in return for acceptance into the club of general management,

  - the larger business DP systems cannot be implemented on a departmental basis.

- The increasing use of the database approach provides the clean interface between end-user and DP department.

  - DP department responsible for supply and upkeep of the databases,
  - User department responsible for the usage of the database resource.

- However, in the short-term direct selling is still required for specific applications and in specific situations.

(iv) COMPUTER SERVICES MARKET GROWTH IN THE U.S.

- The computer services market in the United States in 1977 was $6.8 billion and is forecast to grow 19% in 1978 to $8.1 billion in current dollars.
  - This includes IBM software and services revenues of $0.5 billion.
  - This excludes captive U.S. revenues of $0.4 billion and non-U.S. revenues of U.S. companies of $0.3 billion.
- For the five-year forecast period, the compounded growth is 16%, with the market doubling to $167 billion by 1983.
- Of particular significance are the wide differences in growth rates within segments of the total market.
  - For processing services, general business and industry speciality delivered in an RCS mode will grow at 25%, while scientific and engineering delivered in a batch mode will decline at 7%; other combinations of types and modes of services will have intermediate growth values to yield the key overall market figures shown in Exhibit III-A.6.
  - Industry sector markets, while having individual growth rates clustered between 13% and 17%, vary widely in relative size.
  - Banking and finance is by far the largest market. Of this market in 1977, $310 million was obtained by banks offering correspondent banking services to other banks.
  - Discrete manufacturing and federal government are major markets and are similar in size and growth, but vary greatly in services offered and competitive environment.
  - Transportation and education are the lagging sectors, with the remaining nine sectors forming a middle group.

COMPUTER SERVICES MARKET FORECASTS, U.S. AVAILABLE REVENUES, 1978 - 1983

MODE OF SERVICE	$ MILLION			AVERAGE ANNUAL GROWTH RATE 1978-1983
	1977	1978	1983	
REMOTE COMPUTING	$2,198	$2,707	$ 6,885	21%
FACILITIES MANAGEMENT	914	1,082	2,410	17
BATCH	1,738	1,976	2,364	5
TOTAL PROCESSING	$4,850	$5,765	$11,659	15%
SOFTWARE PRODUCTS				
SYSTEMS	$ 418	$ 508	$ 1,280	20
APPLICATIONS	380	473	1,235	21
TOTAL SOFTWARE PRODUCTS	$ 798	$ 981	$ 2,515	21%
PROFESSIONAL SERVICES	1,187	1,362	2,532	13
TOTAL	$6,835	$8,108	$16,706	16%

EXHIBIT III-A.6

- Software products are forecast to grow at 21%, driven by several forces:

  - The increasing willingness of EDP managers to use packaged software as a partial solution to a growing applications backlog.

  - The profusion of smaller computers.

  - The continued investment by software companies in research and development at a rate double that of the rest of the industry in terms of percent of revenues.

  - The emergence of DBMS and implementation language software as programming languages replacing COBOL, BASIC and ASSEMBLER.

- A more aggressive sale of software by IBM and other hardware vendors would cause actual market growth to exceed the forecast.

- Professional services are forecast to continue to grow at their historic rate of 13%. There is some indication that this growth will acctually accelerate as users turn to outside consulting, programming and systems analysis to assist in implementation of more complex communications based systems. Education and training is in much demand as the nature and complexity of the environment changes.

- One of the most significant factors in the growth of professional services in particular, and computer services in general, is the continuing lack of skilled EDP personnel. Two traditional sources of staff, the federal government and computer manufacturers, are not providing the numbers of trained people that flowed into the computer services industry five years ago.

UNITED KINGDOM

B. THE U.K. (i) GEOGRAPHIC DIVISIONS

The U.K. has been divided into nine regions as follows: (See Exhibit III-B.1)

1. SCOTLAND

This is subdivided into the following regions·

The Highlands	-	main town	Inverness
Grampian	-	" "	Aberdeen
Tayside	-	" "	Dundee & Perth
Fife	-	" "	Glenrothes
Lothian	-	" "	Edinburgh
Borders	-	" "	Selkirk
Dumfries & Galloway	-	" "	Dumfries
Strathclyde	-	" "	Glasgow
Central	-	" "	Stirling

Western Scotland holds most of the older established heavy industry, together with central areas. New industry is springing up in the east. Almost half of employment in Scotland is in the Strathclyde region.
The population of Scotland is around 5.1 million.

2. WALES

This is subdivided into the following regions:

Clwyd	-	main town	Dembigh & Wrexham
Gwynedd	-	" "	Caernarvon
Dyfed	-	" "	Carmarthen
Powys	-	" "	Merthyr Tydfil
Gwent	-	" "	Newport & Monmouth
South Glamorgan	-	" "	Cardiff
Mid Glamorgan	-	" "	Aberdare
West Glamorgan	-	" "	Swansea

Industrially, Wales can be divided into 3 main areas. The South-East, which is heavily industrialised, West & Central, which is rural, and the North-East and North-West. which has light industry and tourism. Wales has approximately 2.8 million inhabitants.

3. NORTHERN IRELAND

This can be subdivided into the following regions (counties):

Down	-	main town	Bangor
Antrim	-	" "	Larne, Antrim, Belfast, Lisburn
Londonderry	-	" "	Londonderry
Donegal	-	" "	Donegal
Armagh	-	" "	Armagh
Fermanagh	-	" "	Ennisfallen

Most of the heavy industry is in the east (Greater Belfast) in a semi circle from Larne, Antrim, Lisburn, Newtownards, Bangor). The rest of Northern Ireland is mainly agricultural with some light industry. There is a population of approximately 1.5 million.

4. NORTHERN ENGLAND

This includes the counties of:

Cleveland	- main town	Middlesborough
Cheshire	- " "	Chester
Cumbria	- " "	Carlisle
Derbyshire	- " "	Derby
Durham	- " "	Durham
Greater Manchester	- " "	Manchester
Humberside	- " "	Hull
Isle of Man	- " "	Douglas
Lancashire	- " "	Preston
Lincolnshire	- " "	Lincoln
Merseyside	- " "	Liverpool
Northumberland	- " "	Berwick on Tweed
Nottinghamshire	- " "	Nottingham
Tyne & Wear	- " "	Newcastle upon Tyne
North Yorkshire	- " "	York
South Yorkshire	- " "	Sheffield
West Yorkshire	- " "	Leeds

This whole region is mostly heavily industrialised and covers almost half of the area of England.

5. MIDLANDS

This includes the counties of:

Bedfordshire	- main town	Luton
Hereford & Worcester	- " "	Worcester
Leicestershire	- " "	Leicester
West Midlands	- " "	Birmingham
Northamptonshire	- " "	Northampton
Salop	- " "	Shrewsbury
Staffordshire	- " "	Stoke-on-Trent
Warwickshire	- " "	Coventry

Almost the whole of this region is heavily industrialised.

6. EAST ANGLIA

This includes:

Cambridgeshire	-	main town	Cambridge
Norfolk	-	" "	Norwich
Suffolk	-	" "	Ipswich

This is the smallest region and is almost entirely agricultural. There are selected pockets of industry, however, in Norwich and Ipswich, for example.

7. LONDON & HOME COUNTIES

This covers Greater London:

Berkshire	-	main town	Reading
Buckinghamshire	-	" "	Milton Keynes
Essex	-	" "	Harlow
Hertfordshire	-	" "	Welwyn Garden City
Kent	-	" "	Maidstone
Surrey	-	" "	Guildford

This area accounts for almost one quarter of the total population of England with around 11½ million people. Many kinds of industry are located here and London itself houses the head offices of many of the nation's large firms.

8. SOUTHERN ENGLAND

This includes:

Hampshire	-	main town	Southampton
Isle of Wight	-	" "	Ryde
Channel Islands	-	" "	St. Helier (Jersey)
Oxon	-	" "	Oxford
East Sussex	-	" "	Brighton
West Sussex	-	" "	Crawley
Wiltshire	-	" "	Swindon

This is mainly an overspill region from No.7, and there is a definite fall-off of industry the further away from London one gets. Tourism is a large industry here.

9. WEST OF ENGLAND

This includes:

Avon	-	main town	Bristol
Cornwall	-	" "	Truro
Devonshire	-	" "	Plymouth
Dorset	-	" "	Bournemouth /Poole
Gloucestershire	-	" "	Gloucester
Somerset	-	" "	Taunton

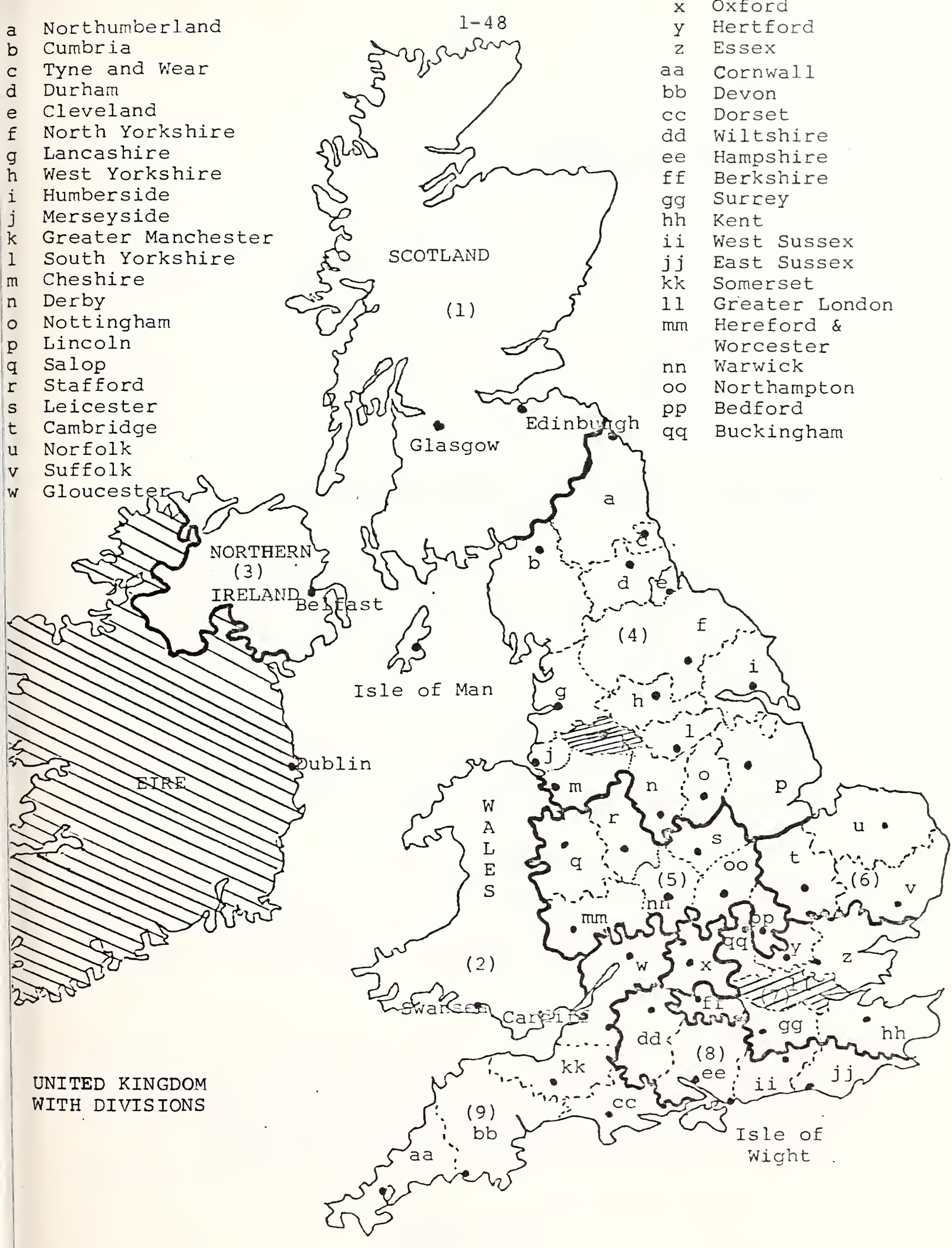
This is mainly a tourist region, with industry centred mainly in Bristol and to a lesser extent, in Plymouth.

EIRE

There is some heavy industry around Dublin, but it is pretty evenly spread around Eire. Around 50-60% of Irish businesses are in Dublin.

1-48

a Northumberland
b Cumbria
c Tyne and Wear
d Durham
e Cleveland
f North Yorkshire
g Lancashire
h West Yorkshire
i Humberside
j Merseyside
k Greater Manchester
l South Yorkshire
m Cheshire
n Derby
o Nottingham
p Lincoln
q Salop
r Stafford
s Leicester
t Cambridge
u Norfolk
v Suffolk
w Gloucester
x Oxford
y Hertford
z Essex
aa Cornwall
bb Devon
cc Dorset
dd Wiltshire
ee Hampshire
ff Berkshire
gg Surrey
hh Kent
ii West Sussex
jj East Sussex
kk Somerset
ll Greater London
mm Hereford & Worcester
nn Warwick
oo Northampton
pp Bedford
qq Buckingham



UNITED KINGDOM
WITH DIVISIONS

Jersey, C.I.

EXHIBIT III-B.1

(ii) ECONOMIC DESCRIPTION

- Exhibit III-B.2 gives the recent values of the basic economic indicators for the U.K.

- Exhibit III-B.3 shows the breakdown of organisations in the U.K. by industry and size of turnover.

(iii) COMPUTER SERVICES MARKET CHARACTERISTICS

- The remote computing services (RCS) market is extremely well developed in the United Kingdom and growing rapidly (22% per annum). In 1978, remote computing services revenues were $188 million, of which $102 million was for remote batch services.

- Batch services was the largest component of the services market worth $270 million in 1978. The services market total of $706 million in 1978 makes the UK the third largest country market in Western Europe.

- A 1977 analysis of the largest U.K. companies showed that there is still a high number of important organizations spending upwards of $20,000 per month on EDP services, who are prepared to switch to a competitive service, providing guarantees of reliability are offered and the new service is economically justified.

- The computer services industry in the U.K. is composed of 580 active companies. Over 900 are known to the National Computer Centre (NCC) to have existed at one time or another over the last five years; many have merged or been acquired and appear under different names today.

BASIC ECONOMIC STATISTICS

UNITED KINGDOM

INDICATOR	YEAR	
	1977	1978
GDP + £B	113	127
GDP + $B**	198	249
Population (millions)		
- Total	56.05	56.09
- Total Working	25.03	25.08
Agriculture, etc.	0.68	0.66
Manufacturing	9.56	9.34
Service Industries	14.80	15.08
No. of organisations * (thousands)	-	844,800
No. of establishments * (thousands)	-	1,400,000

\+ At market prices

** At current exchange rates

* These figures include the numbers engaged in agriculture, forestry and fishing, but exclude businesses run from home premises.

SOURCES: COI and INPUT estimates

EXHIBIT III-B.2

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

UNITED KINGDOM

ISIC Code	Industry	Enterprise by Size of Annual Turnover (£)			
		5.0M	5.0 - 50M	50M	Total
11 - 13	Agriculture/Forestry/ Fishing,	34,950	14,750	300	50,000
21 - 29	Mining/Quarrying	1,500	440	60	2,000
31 - 39	Manufacturing	71,000	7,500	1,500	80,000
41	Electricity/Gas etc.	1,700	250	50	2,000
50	Construction	25,900	2,000	100	28,000
61 - 63	Wholesale/Retail	494,455	5,500	45	500,000
71 - 72	Transport/Communications	137,620	2,500	80	140,200
81	Financial	940	340	120	1,400
82	Insurance	290	360	50	700
83	Business Services/ Professions	34,600	2,890	10	37,500
91	Government	1,500	1,450	50	3,000
	TOTAL	804,455	37,980	2,365	844,800

EXHIBIT III-B.3

- A large proportion of the remainder have gone out of business, showing the U.K. market now presenting the profile of a market that has achieved a measure of consolidation and maturity. With this maturity has come a period of growth in RCS, where the impact of vendor pressure as a factor in market expansion is clearly visible.

- The U.K. is the hunting ground par excellence of U.S. computer services groups wishing to acquire an operational base in the European market. ADP, On-Line Systems, and Martin Marietta have all established themselves in the U.K. via acquistion.

- Combined with the acquisition strategy of large spin-off services companies like British Oxygen and Unilever, this trend has led to the formation of large aggressive multi-service vendors in the U.K.

- Exhibit III-B.4 shows the Top 20 and Top 10 services vendors' market shares by type of service and Exhibit III-B.5 gives market sizes of types of service.

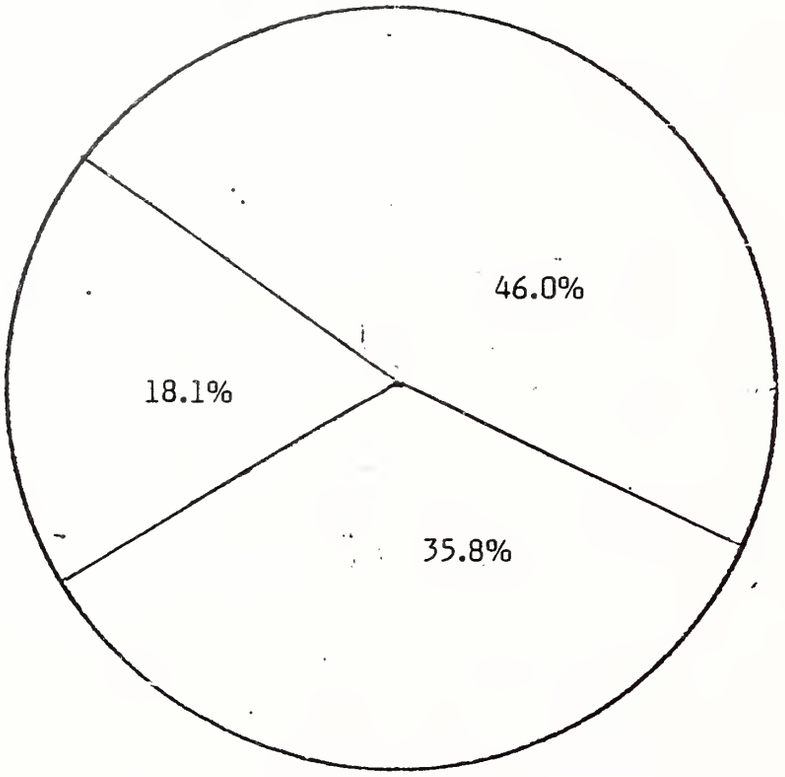
- The vast majority of computer services vendors (69%) are privately owned. None are quoted on the stock exchange. A similar majority of vendors are concentrated in London and the South East (see Exhibit III-B.6).

- In the last five years, the number of spin offs (or organizations who set up their EDP departments as separate entities offering computer services) has increased. As partial reflection of this trend 77% of the U.K. computer services revenue comes from the private sector, whereas only 14% comes from the public sector (4% from Central Government) and 9% from clients based outside the U.K.

- All computer services categories in the United Kingdom market show a clear growth trend overall, although the rate of growth varies substantially between bureau categories and organisation size groups. Non-users remain the majority of the total "Times 1000" population, which lends credence to the "large company-only" strategy adopted by many computer services vendors.

COMPUTER SERVICES MARKET 1978
UNITED KINGDOM

THE TOP TWENTY (£186M = 53.6% of Market)

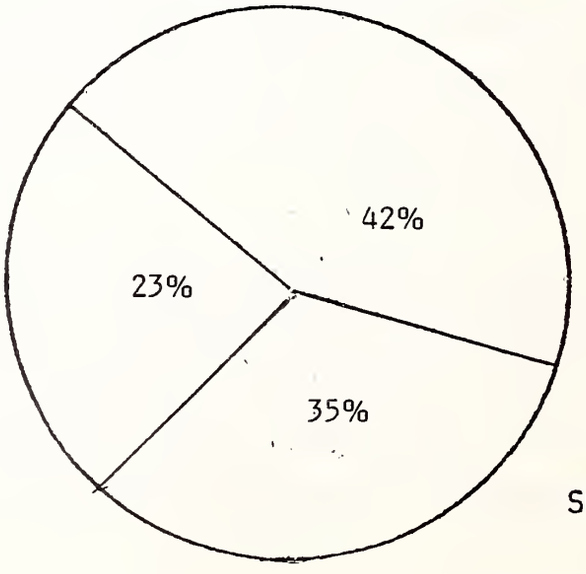


BATCH
ERVICES

RCS

SOFTWARE
AND
PROFESSIONAL
SERVICES

THE TOP TEN (£131M = 37.7%)



BATCH

RCS

SOFTWARE
ETC.

EXHIBIT III-B4

THE U.K./EIRE COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M *	%	$M *	%	
RCS PROCESSING	136	25.3	188	27	38%
BATCH SERVICES	185	34.4	223	32	21%
SOFTWARE PRODUCTS	33	6.1	56	8	70%
PROFESSIONAL SERVICES	184	34.2	239	33	31%
TOTAL	538	100	706	100	31%

SOURCE: CAMP/EUROPE AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES

EXHIBIT III-B.5

UNITED KINGDOM VENDOR GEOGRAPHICAL DISTRIBUTION

LOCATION	SERVICE CATEGORY (%)	
	PROCESSING	CONSULTANCY AND SOFTWARE
ENGLAND		
- NORTH	8%	17%
- EAST	1	2
- MIDLANDS	11	17
- SOUTHWEST	2	5
- S.E. AND LONDON	67	54
SCOTLAND	7	3
IRELAND	3	1
WALES	1	1
TOTAL	100%	100%

SOURCE: COMPUTER USER'S YEARBOOK 1977

EXHIBIT III-B.6

- Substantial business growth can therefore be sustained by accurately targeting this large company group.

- An overall view of the U.K. bureau market is one which encompasses high frequency of usage of external services (43% of the top 1500 companies) and a lower tendency to find an in-house solution (73% of the top 1500 companies have in-house installations). RCS growth potential is as good as any in Western Europe and is aided by a progressive PTT which provides cheap and good quality data transmission services.

(iv) SUPPLIERS AND COMPETITION

- The large number of RCS suppliers already established on the market should not be considered as a deterrent to the creation of a new supplier. The rapid development of the market has more than coped with the expansion of the main vendors, so that the U.K. market is not a harshly competitive environment.

- A factor that is unique to the U.K. market is the degree to which ICL equipment is used for computer services. In terms of hardware share, based on the number of machines installed, ICL has a 40% penetration. In terms of revenue, however the picture is drastically different.

1977 U.K. AND ICL-BASED MARKET SIZES ($M)

MARKET	BATCH	REMOTE BATCH	INTER-ACTIVE	OTHERS	TOTAL
UK TOTAL	$190.00	$75.00	$53.00	$150.00	$468.00
ICL-BASED	57.0	11.8	7.8	35.0	111.6
ICL SHARE	30%	16%	15%	24%	24%

- Due to ICL weakness in telecommunications, the RCS share is far below the Batch business. This situation is being improved, notably with the introduction of the 2900 series into the major bureaux (eight at this time). COMPUTEL has begun to generate one-third of its revenue from RCS on its ICL 2960. The largest ICL bureau, Baric, is 85% batch, however.

- IBM has nearly completed the restructuring of its Data Centre Services and Remote Computing Services (both part of IBM DP Division).

  - An aggressive growth plan is in the early stages of implementation with the super centre at Warwick, which can house as many as six IBM System/370 Model 168s tied to a network of 80 high speed lines and 10 concentrators serving the U.K. market.

  - To date, only one 370/168 has gone live with the concentrators switching customers to either Warwick or the existing 370/155s in London, used for the Terminal Business Systems and Call Services. IBM continued to run batch bureaux in Croydon, Manchester, and Birmingham.

- GEISCO is one of the few suppliers to cover the entire country and whose presence is felt everywhere. GEISCO is more concerned with growth than with competition, an indication of the buoyant state of the U.K. RCS market.

- CDC provides mainly Remote Batch services. In the words of some competitors, CDC is "rarely seen" in competitive situations. The drastic pruning of the Brussels-based European headquarters has unsettled the data services group. The Call 370 service acquired from IBM has been partially merged with the Cybernet service with limited marketing success.

- COMSHARE Ltd. is the prime supplier of Interactive Services (though not the largest). Growth is anticipated to be 47% in 1978, coming mainly from banking, government and other specialized markets where the value-added can be maximized. This specialization insulated the company from competition to a great extent.

- Centrefile is a major RCS vendor, mainly for interactive services. The company's main strength is its link with National Westminster Bank and the latter's 3,500 branches that serve as a collection/distribution and semi-marketing force for Centrefile's services. Referrals of significant new business come from this network.

  - Centrefile has the Motor Vehicle Registration (SMMT) monopoly, which is bought by all car manufacturers.

  - It also has the Law Society's time recording service license and a near-monopoly of the building society business.

- ADP's main RCS strength in Europe lies currently in the U.K. and Holland through the former Time Sharing Ltd. and Cyphernetics operations, respectively. The combination is currently trading as ADP Network Services International.

- Atkins On-Line has become a significant supplier of Interactive Services, largely based on OLIVER, a problem-solving language, which produced over $1 million in 1977. APL, Financial Planning and Engineering services provided the remainder of the $4.1 million of Interactive Services. The Atkins group, formerly the parent before the On-Line acquisition, provided $780,000 in revenues. (Now acquired by UCS - 1979).

- No single Batch Services vendor emerges from the survey as a strong leader in the service category. Baric is marginally the most frequently found followed by BOC. However in the building societies sector Centrefile absorbs 90% of the business, this boosting their overall standing.

- Remote Batch vendors concentrating on large organisations can be readily identified by comparing the ranking in large organisations with overall market performance; the vendors which stand out in this respect are Centrefile, Lowndes Ajax, Computel and Compower. An overall ranking for Remote Batch Services ranks IBM first, followed by BOC, UCSL and UCC.

- The Top 10 vendors of computer services are given in Exhibit III-B.7, with the revenue generated by each category.

THE TOP TEN COMPUTING SERVICES VENDORS - UNITED KINGDOM 1978

SOURCE: CAMP/EUROPE

RANK	VENDOR	REVENUE IN MILLIONS OF POUNDS STERLING (£ M)			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	IBM	14.0	20.0	1.0	35.0
2	ICL Dataskil	-	-	16.0	16.0
3	BOC Datasolve	6.0	3.0	4.0	13.0
4	SCICON	0.1	3.6	9.0	12.7
5	H-IS (GEISCO)	-	10.2	-	10.2
6	Logica	-	-	10.0	10.0
7	Systime	-	-	9.1	9.1
8	UCSL	-	8.0	1.0	9.0
9	CMG	1.0	4.0	3.0	8.0
10=	CAP-CPP	-	-	7.0	7.0
10=	ICL Baric	6.5	0.5	-	7.0

(v) COMPUTER SERVICES MARKET FORECASTS BY TYPE OF SERVICE

- Exhibit III-B.8 shows the sector forecasts for the five-year forward period.

- Professional Services will remain the largest sector at 34%. RCS will oust Batch services from second place by increasing its market share by 1%, from 27% to 28%.

- Largest proportional growth will be had by Software Products, up in share from 8% to 14%.

THE UK/EIRE COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977 **	1978 **	GROWTH 77 - 78 (%)	1979 *	1980 *	1981 *	1982 *	1983 *	AAGR (%)
RCS PROCESSING	136	188	38	233	275	333	413	516	22
BATCH SERVICES	185	223	21	260	300	347	395	435	14
SOFTWARE PRODUCTS	33	56	70	76	102	139	189	257	36
PROFESSIONAL SERVICES	184	239	30	296	356	427	521	635	21
ALL	538	706	31	865	1033	1246	1518	1843	21

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

EXHIBIT III-B.8

FRANCE

C. FRANCE

(i) GEOGRAPHIC DIVISIONS

France was sub-divided into nine regions listed on page 64. Although the regions are geographically defined, they each contain whole "Departments" (French administrative divisions and the second level of government), i.e. no department is split to be contained in more than one region.

Area 1: Northern France - major cities - Lille, Amiens. Close to the Belgian border, this area's southern limits extend to the edge of Greater Paris.

Area 2: Normandie - major cities - Caen, Rouen. This area runs between Brittany in the west and Northern France/Greater Paris in the east, and south as far as a line a little north of Le Mans.

Area 3: Brittany - major cities - Rennes, Nantes. Projecting into the Atlantic Ocean, Brittany is a clearly defined region with its inland border lying just to the east of its two largest cities mentioned above.

Area 4: Eastern France - major cities - Metz, Nancy, Troyes. This area extends from the Belgian and German borders in the north and east respectively, to Gtr. Paris in the west, and a little north of Dijon in the south.

Area 5: Greater Paris - Very large metropolitan area of 8m people, where 66% of the companies listed in this directory are located.

Area 6: Central France - major cities - Blois, Limoges, Orleans, Poitiers, Tours, Tulle. This is the largest reegion in area size, extending from theAtlantic in the west and almost as far as the Loire in the east, and bounded in the north by Normandie and in the south by a line fluctuating from level with the Gironde to just south of Limoges.

Area 7: South-Western France - major cities - Bordeaux, Toulouse. A large area bordered by the Atlantic and the Pyrenees in the west and south, Central France (defined above) in the north and the Massif Central in the east.

Area 8: Bourgogne-Lyonnais - major cities - Dijon, Lyon. This region runs roughly between the Loire and the Swiss border (west/east) and between Eastern France and a line fluctuating around the latitude of Lyon (north/south).

Area 9: South-Eastern France and Corsica - major cities - Marseille, Nice. This area is bounded by the Bourgogne Lyonnais and the Mediterranean (north/south) and by South-Western France and Italy (west/east).

FRANCE

rea No.	Area	Départements Included	Major Cities
1	Northern France	Nord, Pas de Calais, Somme, Aisne	Lille, Amiens
2	Normandie	Seine Mtme, Eure, Calvados, Manche, Orne	Rouen, Caen
3	Brittany	Finisterre, Côtes du Nord, Morbihan, Ille-et-Vilaine Loire Atlantique	Rennes, Nantes
4	Eastern France	Ardennes, Marne, Aube, Hte Marne, Vosges, Meuse, Moselle,Meurthe-et-Moselle, Bas-Rhin, Haut Rhin	Nancy, Troyes, Metz
5	Greater Paris	Paris, Oise, Val d'Oise Seine St. Denis, Seine-et-Marne, Essonne, Yvelins	Paris
6	Central France	Mayenne, Sarthe, Eure-et-Loire, Loiret, Loire-et-Cher, Cher, Maine-et-Loire, Indre, Indre-et-Loire, Creuse, Correze, Hte Vienne, Charente, Vendée, Charente Maritime, Vienne, Deux-Sèvres, Puy-de-Dôme, Cantal	Tours, Orléans, Limoges, Tulle, Blois, Poiters
7	South-Western France	Dordogne, Gironde, Lot, Aveyron, Tarn, Aude, Pyrénées Or, Ariège, Tarn-et-Garonne, Gers, Hte. Garonne, Lot-et-Garonne, Hts. Pyrénées, Bas Pyrénées, Landes	Toulouse Bordeaux
8	Bourgogne Lyonnais	Yonne, Nievre, Côte d'Or, Saône-et-Loire, Hte.Saône, Doubs, Ain, Jura, Savoie, Rhône, Hte. Savoie, Loire, Allier.	Dijon, Lyon
9	South-Eastern	Hte. Loire, Lozère, Gard, Ardèche, Hérault, Isère, Drôme, Htes Alpes, Alpes-Htes-Provence, Var, Alpes Mtme, Vaucluse, Bouches du Rhône.	Marseille, Nice

FRANCE

EXHIBIT III-C.1

(ii) ECONOMIC DESCRIPTION

- The French economy has, in the last two years, undergone a period of inflation, with the inflation rate increasing steadily. Firm central government measures to counter this trend were taken in the summer of 1979, but there has not yet been sufficient time to assess the impact of them.

- Exhibit III-C.2 shows the last two years' values of the basic economic statistics.

- Exhibit III-C.3 shows the number of organisations in France, broken down by industry and size.

(iii) COMPUTER SERVICES MARKET CHARACTERISTICS

- France is the largest European computer services market, but in contrast to the distributed nature of its competitor, Germany, 75% of all business done on the French market is done in the greater Paris area (Paris and its "banlieue"). This has led to the development of a group of very large computer services companies (in European terms).

- With nearly 700 vendors in the market, competition is very keen. But more importantly, the French market is influenced by the "old boys" network in effect, whereby who you know in business circles is almost as important as what you know about the business in question. This is particularly true of the banking, government, and para-public sectors.

- Thus, the two largest computer services vendors in France, CISI/SIA, which is 100% owned by CEA (Government Atomic Energy Commission) and CAP/GEMINI/SOGETI (the largest European software company, owned 34% by CISI/SIA) swear they are competitors and operate at arm's length, while simultaneously holding regular joint planning meetings.

BASIC ECONOMIC STATISTICS

FRANCE

INDICATOR		YEAR	
		1977	1978
GDP +	FFB	1630	1826
	$B**	333	385
Population (millions)			
- Total		53.3	53.7
- Total Working		20.95	21.00
Agriculture, etc.		2.18	2.11
Manufacturing		8.16	8.09
Service Industries		10.61	10.80
No. of organisations * (thousands)		-	895,500
No. of establishments * (thousands)		-	2,301,000

\+ At market prices

** At current exchange rates

* These figures include the numbers engaged in agriculture, forestry and fishing, but exclude businesses run from home premises.

SOURCES: INSEE and INPUT estimates

EXHIBIT III-C.2

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

FRANCE

ISIC Code	Industry	Enterprise by Size of Annual Turnover (FF)			
		5M	5.0 - 50M	50M	Total
11 - 13	Agriculture/Forestry/ Fishing,	94,500	5,000	500	100,000
21 - 29	Mining/Quarrying	3,655	1,300	45	5,000
31 - 39	Manufacturing	79,200	30,000	800	110,000
41	Electricity/Gas etc.	250	200	50	500
50	Construction	118,000	16,835	165	135,000
61 - 63	Wholesale/Retail	193,615	8,000	385	202,000
71 - 72	Transport/Comm	200,000	10,800	100	210,900
81	Financial	950	1,800	350	3,100
82	Insurance	400	1,150	200	1,750
83	Business Services/ Professions	120,000	4,800	200	25,000
91	Government	1,400	800	50	2,250
	TOTAL	811,970	80,685	2,845	895,500

SOURCE: INPUT ESTIMATES

EXHIBIT III-C.3

- This combination of government (CEA), Batch, Remote Batch, and Interactive Services (from CISI/SIA), and professional services and software products (from CAP/GEMINI/SOGETI), has been extremely effective. They jointly captured revenues equivalent to 23% of the French market in 1977 (22% of this revenue came from foreign markets, however).

- In spite of the strength of French vendors, the French government has decided to reject applications by US owned RCS companies to set up in the French market. This results from their view that indigenous vendors are still not strong enough to withstand competition from such companies as GEIS and IBM.

- Excluding the equipment manufacturers who offer services, nearly 60% by number of the vendors in France are limited companies (Societes Anonymes) with a further 28% established as limited partnerships (Societes a responsibilite limitee).

- Exhibit III-C.4 gives the share of the computer services market occupied by each type of service, and Exhibit III-C.5 shows the growth rate of each type of service.

- The French market is characterized by strength in two major submarkets : RCS and software products (SP). The latter has rapidly developed into the largest software products country market in Europe, with Paris headquartering many foreign (and U.S.) software products vendors.

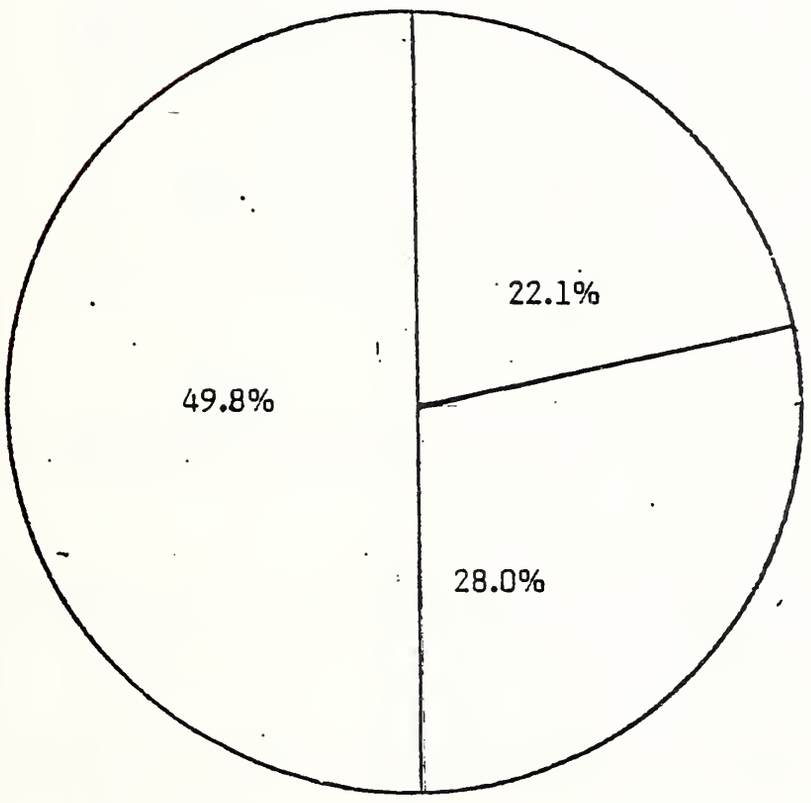
- The French RCS market was worth $280M in 1978 (INPUT estimate). Over the next four years (1979-1982 inclusive) the annual growth rates for Interactive and Remote Batch Services will be 24% and 6%.

- Batch Services account for half of the total computer services market (including software, training, etc) and was worth $631M in 1978 (INPUT estimate). The annual growth rate over the next four years is expected to be 20%.

COMPUTER SERVICES MARKET 1978

FRANCE

ALL VENDORS



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VICES

THE TOP TEN

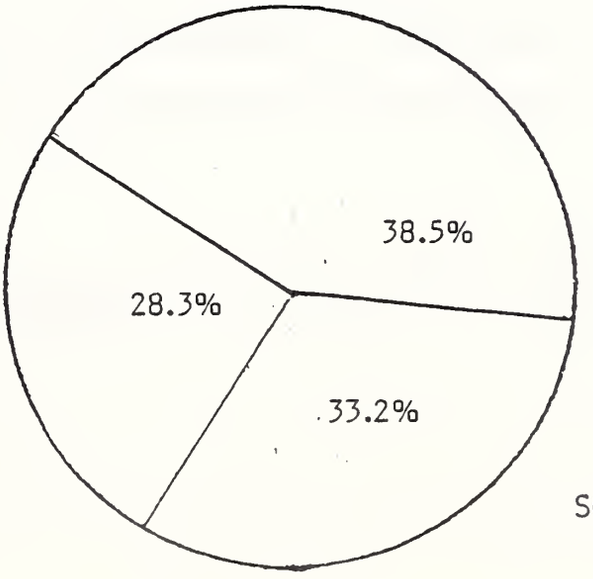


EXHIBIT III-C4

THE FRENCH COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M *	%	$M *	%	
RCS PROCESSING	200	22.1	280	22.1	40%
BATCH SERVICES	449	49.6	631	49.8	41%
SOFTWARE PRODUCTS	50	5.5	76	6.0	52
PROFESSIONAL SERVICES	207	22.8	279	22.0	35
TOTAL	906	100	1266	100	40%

SOURCE: CAMP/EUROPE AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES

EXHIBIT III-C.5

- French PSN line costs are quite competitive and compare favourably with the European average. The quality of the lines does not compare well, however, nor does the average delay in obtaining lines (although this has vastly improved, halving in the last two years to today's average of ten weeks).

- PSN connection costs are very high at the short distance end and also entail a monthly rental. As the distance grows to 150km or more, the charge becomes more comparable to other major European countries.

- Leased lines are the second most expensive in Europe and by such a margin that one wonders how they can be justified in the eyes of the PTT, let alone the users.

(iv) SUPPLIERS AND COMPETITION

- Batch Services are the most popular services of all for the Industrial and Financial groups examined and offer the widest selection of vendors of all three categories. Whereas most offer a variety of applicational capabilities, the two most popular suppliers, SITB and CCMC are both specialists: SITB in banking services, CCMC in accountants' services.

- AMI, SG2 and GSI emerge as the second tier of Batch suppliers in France. None of these has a clearly dominant position, but the vendors have been listed, in approximate order of popularity according to the Top 1000 companies. SG2, GSI, CISI and IBM figure prominantly in all three service categories (Batch, Remote Batch and Interactive).

- Since the local and Government markets were not examined, there is a strong "commercial" bias to this analysis of the Batch Services market. For this reason CISI is not a leading supplier.

THE TOP TEN COMPUTING SERVICES VENDORS - FRANCE 1978

SOURCE: CAMP/EUROPE

RANK	VENDOR	REVENUE IN MILLIONS OF FRENCH FRANCS (FFM)			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	CAP/SOGETI	-	-	510	510
2	CISI	236	198	40	474
3	GSI	258	109	62	429
4	SEMA/METRA	30	-	390	420
5	SG2/TELSYS	200	30	80	310
6	SLIGOS	127	131	-	257
7	IBM	102	97	28	227
8	TELESYSTEMES	45	25	104	174
9	CCMC	123	28	20	171
10	TSIL (Thomson Group)	35	15	98	148

EXHIBIT III-C.6

- CISI, SG2 and CCMC are all gradually installing a nationwide network capability in France to share computing power between their own processing centres. This decentralisation of processing has yet to be achieved at the user level.

- The number of individual vendors supplying Remote Batch Services to the Top 1500 companies is greatly reduced in comparison with the Batch Services market. The top three suppliers to this level of company are SG2 (easily the most frequently referenced), IBM (a close second) and CISI.

- Among the Interactive Services suppliers most frequently mentioned by the users surveyed, CEGI-TYMSHARE is the clear leader followed by IBM and HB-NIS. The number of vendors involved in T/S supply to the French market is growing.

- SG2 includes Telsys and Franlab (acquired by CISI in 1979) references, as throughout the study. Along with SLIGOS, CISI and GSI, it forms the second tier of T/S suppliers. The majority of all references to T/S vendors are for sole source supply, a feature that is rare in other Western European markets.

- The Top Ten computer services companies in France are tabled in Exhibit III-C.6.

(v) COMPUTER SERVICES MARKET FORECASTS BY TYPE OF SERVICE

- Good growth is anticipated in all market sectors for France in the forecast period. The lowest sector growth rate will be experienced in Batch Services. However, with an average annual rate of 15%, this sector will still be the dominant sector in 1983, taking a 44% market share. Beyond this period, growth will turn into a decline.

- Software Products and Professional Services both grow at the above average rate of 23%.

- Exhibit III-C.7 shows the detailed five-year forecast, the whole country market having a 19% AAGR.

THE FRENCH COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977 **	1978 **	GROWTH 77 - 78 (%)	1979 *	1980 *	1981 *	1982 *	1983 *	AAGR (%)
RCS PROCESSING	200	280	40	350	438	534	651	781	22
BATCH SERVICES	449	631	41	801	978	1124	1259	1385	15
SOFTWARE PRODUCTS	50	76	52	85	97	119	154	193	23
PROFESSIONAL SERVICES	207	279	35	334	436	523	628	753	23
ALL	906	1266	40	1570	1949	2300	2692	3112	19

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

WEST GERMANY

D. WEST GERMANY

(i) GEOGRAPHIC DIVISIONS

- Germany has been sub-divided into seven regions as defined on the following page.

- The sections have been determined basically by industrial areas, and where this is not a clearly defined region, by Province (the German second level of government) or by postal district.

Area 1 - West Berlin - a concentrated industrial area, with a population in excess of 1,000,000.

Area 2 - Major cities - Hamburg, Bremen, Bremerhaven and Oldenburg, with shipbuilding a major industry of the region. This area extends from the border with the Democratic Republic in the east, to the Dutch border in the west, and to the south as far as the northern tips of the Ruhr area and just north of Hannover.

Area 3 - the smallest area apart from West Berlin - major cities - Hannover, Braunschweig and Kassel, it extends from the DDR border in the east to the edge of the Ruhr in the west, and south about 20 miles south of Kassel.

Area 4 - Runr - the most heavily industrialised region in Germany, it includes the large cities of Cologne, Dusseldorf, Essen, Dortmund and Duisburg. Its western edge is the Dutch border, and a line is drawn extending from northern Hessen, in the north-east of the region to the Luxembourg border in the south-west extremity, and running along part of the River Mosel. This includes a northwestern portion of the Rhineland Palatinate.

Area 5 - major cities - Frankfurt, Mannheim, Darmstadt, Wiesbaden, and Mainz, and extends south as far as the River Jagst, and east to beyond Wurzburg.

Area 6 - major cities, Stuttgart, Karlsruhe, and Freiburg. This region is bounded on the east by the Bavarian border as far north as where it meets the River Jagst.

Area 7 - Mostly Bavaria - major cities - Munich, Augsburg and Nurnberg.

WEST GERMANY
including West Berlin

Area No.	Area	incl. major cities
1	West Berlin	
2	Schleswig Holstein Lower Saxony (northern part)	Hamburg, Bremen, Bremerhaven, Kie Lübeck, Oldenburg
3	Northern Hessen Lower Saxony (southern part)	Hannover, Braunschweig, Kassel
4	Ruhr - North Rhein Westphalia	Düsseldorf, Cologne, Wuppertal, Bonn, Essen, Dortmund, Bielefeld
5	Southern Hessen Rhineland Palatinate Saarland Baden Württemberg (northern part)	Frankfurt, Wiesbaden, Darmstadt, Mainz, Saarbrücken, Würzburg, Mannheim, Ludwigshafen
6	Baden Württemberg (southern part)	Stuttgart, Freiburg, Baden Baden
7	Bavaria	Munich, Augsburg, Nürnberg


WEST GERMANY
Kiel
Bremerhaven
Hamburg
AREA 2
SCHLESWIG HOLSTEIN
& LOWER SAXONY
(NORTHERN PART)
Bremen
HOLLAND
AREA 1
WEST BERLIN
Hanover
Braunschweig
AREA 3
N. HESSEN &
LOWER SAXONY
(SOUTHERN
PART)
EAST
GERMANY
Duisburg
Dortmund
Kassel
Dusseldorf
Cologne
AREA 4
RUHR, N. RHINE
WESTPHALIA
AREA 5
S. HESSEN, RHINE -
LAND PALANTINATE
SAARLAND, BADEN
WURTTEMBERG (N. PART)
CZECHOSLOVAKIA
Frankfurt
Mainz
Wurzburg
Mannheim
Nurnberg
Saarbruecken
Karlsruhe
Stuttgart
AREA 7
BAVARIA
FRANCE
AREA 6
BADEN WURTTEMBERG
(S. PART)
Augsburg
Munich
AUSTRIA
Freiburg

(ii) ECONOMIC DESCRIPTION

- The West German economy has been one of the most stable in recent years, providing an example to other countries of how to manage the inflation problem. Nevertheless, the country's industrial and business leaders are concerned about keeping unemployment at an acceptable level.

- Exhibit III-D.2 shows the previous two years' value of certain basic economic indicators.

- Exhibit III-D.3 gives a table of organisations in West Germany, broken down by industry and size.

(iii) COMPUTER SERVICES MARKET CHARACTERISTICS

- There are nearly 1,000 computer services companies in West Germany. The stable nature of the German economy over the past eight to ten years has done little to force consolidation. Add to this the distributed nature of the business community served, and there emerges the picture of a market spread relatively evenly over seven major regions:

  - Stuttgart
  - Hamburg/Bremen*
  - Hannover/Bremen*
  - Frankfurt
  - Munich
  - Ruhr-Gebiet (Dortmund, Essen, Cologne, Dusseldorf, Duisburg)
  - Berlin

  * Bremen near enough to both to be served by either.

BASIC ECONOMIC STATISTICS

WEST GERMANY

INDICATOR	YEAR	
	1977	1978
GDP + DMB	1018	1154
GDP + $B**	437	547
Population (millions)		
- Total	61.40	61.28
- Total Working	25.02	24.99
Agriculture, etc.	1.66	1.56
Manufacturing	11.33	11.30
Service Industries	12.04	12.13
No. of organisations * (thousands)	-	1,300,000
No. of establishments * (thousands)	-	1,700,000

\+ At market prices

** At current exchange rates

* These figures include the numbers engaged in agriculture, forestry and fishing, but exclude businesses run from home premises.

SOURCES: German Chamber of Industry and Commerce and INPUT estimates

EXHIBIT III-D.2

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

WEST GERMANY

ISIC Code	Industry	Enterprise by Size of Annual Turnover (DM)			
		1M	1M - 100M	100M	Total
11 - 13	Agriculture/Forestry/ Fishing,	284,000	2,990	10	287,000
21 - 29	Mining/Quarrying	495	1,500	5	2,000
31 - 39	Manufacturing	76,776	27,800	424	205,000
41	Electricity/Gas etc.	1,850	100	50	2,000
50	Construction	60,000	2,400	100	62,500
61 - 63	Wholesale/Retail	529,990	9,927	83	440,000
71 - 72	Transport/Comm	168,000	6,905	95	175,000
81	Financial	12,000	1,780	220	14,000
82	Insurance	2,420	900	180	3,500
83	Business Services/ Professions	102,000	2,924	76	105,000
91	Government	2,530	1,315	155	4,000
	TOTAL	1,240,061	58,541	1,398	1,300,000

SOURCE: INPUT ESTIMATES

EXHIBIT III-D.3

- Each major town within these areas is served by a large variety of batch bureaux, each with its own speciality and near enough to the local clientele to allow fast turnaround. Germany's communications costs are the highest in Europe and do not encourage the development of RCS.

- For all of these reasons, there are few very large German computer services vendors. Despite the fact that Germany is the largest market in Europe, there are few sizeable and easily attainable market areas that are not divided between a multiplicity of small companies, all operating locally.

- The structure of the market, therefore, is that of a few large companies (DATEV, FIDUCIA, Mannesman, MBB, Taylorix, IBM) followed by several medium-sized companies (AC-Service, MKD, DVO, GEIS, etc.) followed by innumerable very small local operations (most of which are privately held).

- For the geographic reasons already given, the German market is batch orientated. In 1978 the market for Batch Services was worth $505M (INPUT estimate); this market will grow at an annual rate of 18% over the period 1978-1982.

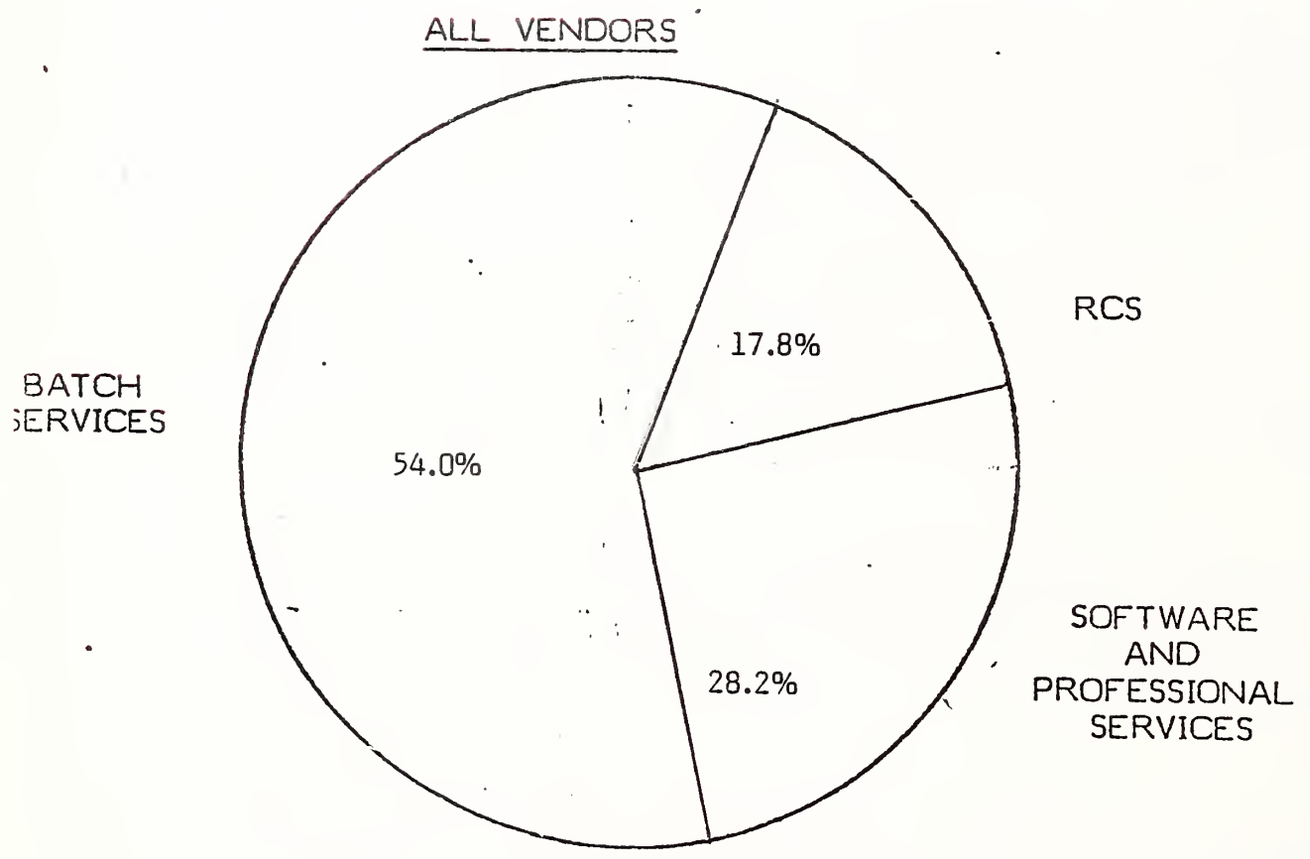
- The market for RCS is relatively undeveloped, being worth in 1978 $167; this market is expected to grow at an annual rate of 15% in the case of Interactive Services and 14% in the case of Remote Batch.

- The quality of the German PTT network services is the best in Western Europe and is continually being improved. Quality is expressed as measuring the reliability of the lines provided, speed of support for installation modification, line capacity available for expansion and short delay in obtaining it.

- It is estimated that the German public network is, on average, never loaded beyond 80% capacity. The importance, to a businessman, of this feeling of "communicability" cannot be overstressed.

COMPUTER SERVICES MARKET 1978

WEST GERMANY



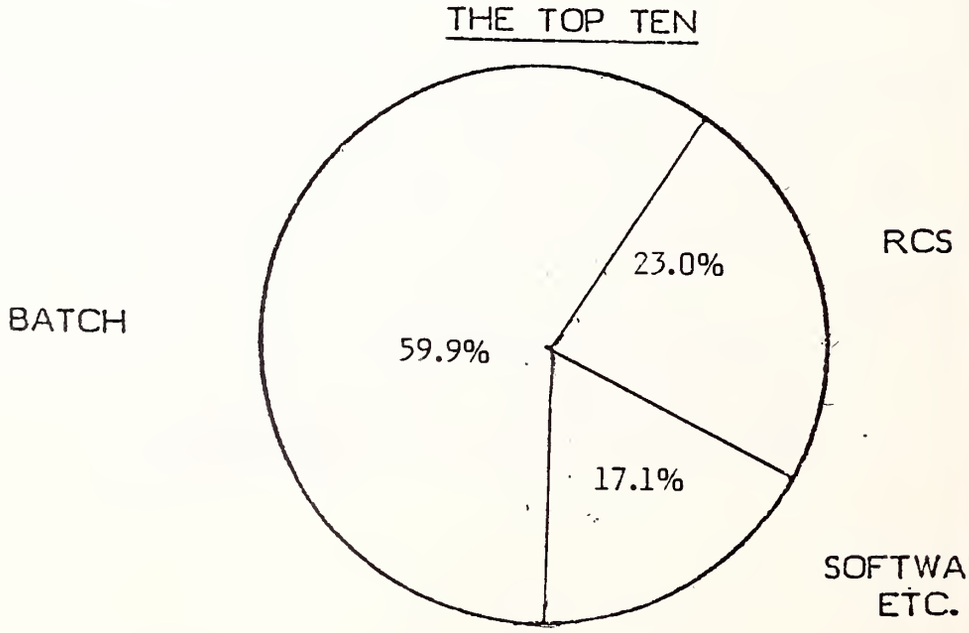


EXHIBIT III-D4

THE WEST GERMAN COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M *	%	$M *	%	
RCS PROCESSING	118	17.5	167	17.8	42
BATCH SERVICES	354	52.7	505	54.0	43
SOFTWARE PRODUCTS	44	6.6	61	6.5	39
PROFESSIONAL SERVICES	156	23.2	203	21.7	30
TOTAL	672	100	936	100	39

SOURCE: CAMP/EUROPE AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES

EXHIBIT III-D.5

- Unfortunately, this very high quality and availability of German communications has a stiff price. PSN line costs are up to two and one half times the cost of the peak rate for equivalent lines in the UK.

- Germany has the lowest usage by large organisations in Europe of external computing services ; conversely this country has the highest usage of in-house installations.

- Exhibit III-D.4 shows a percentage breakdown of the market by type of service, and Exhibit III-D.5 gives the growth rate of each type of service.

(iv) SUPPLIERS AND COMPETITION

- IBM's dominance of the in-house installations is reflected in their equally dominating position in the external services market. (See Exhibit III-D.6). In Batch Services IBM has a margin of 4 to 1 over its nearest rival (AC) as measured by number of accounts; in Interactive Services IBM's margin is narrowed to 2 to 1 over its nearest rival (GEIS). An exception to this dominance occurs in the Remote Batch Services area where IBM runs second with many others to CDC; however, the Remote Batch market is much less significant than the other two - perhaps, because IBM does not try so hard.

- Since IBM and GEIS hold 75% of the Interactive accounts in the sample they together completely dominate the market - particularly in the manufacturing, construction, banking and insurance sectors.

- CDC's market position is diametrically opposed to that of IBM; they are top of the Remote Batch suppliers but bottom of the Batch and Interactive suppliers.

- Although IBM is the market leader in external (Batch, Remote Batch and Interactive) services, Honeywell is a strong second. Indeed, in the supply of Interactive services, IBM and Honeywell are together holding 75% of the accounts with top companies.

THE TOP TEN COMPUTING SERVICES VENDORS
- WEST GERMANY 1978/79

SOURCE: CAMP/EUROPE

RANK	VENDOR	REVENUE IN MILLIONS OF DEUTSCH MARKS (MDM)			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	IBM	76.4	38.0	12.2	126.6
2	DATEV	69.8	39.4	3.2	112.4
3	MANNESMANN	68.8	7.8	6.1	82.7
4	FIDUCIA	28.6	16.6	3.3	48.5
5	SCS	-	-	38.6	38.6
6	MBB	10.7	21.0	-	31.7
7	KIEN BAUM	-	-	27.5	27.5
8	DATEL	23.0	2.5	0.5	26.0
9=	FISCHER	24.9	-	-	24.9
9=	SPL	-	-	24.9	24.9

EXHIBIT III-D.6

- DATEV ranks third in both Batch and Remote Batch services; as a supplier of all batch services they can be considered second to IBM. No respondants in the sample use Datev for Interactive services - presumably these are not offered.

(v) COMPUTER SERVICES MARKET FORECASTS BY TYPE OF SERVICE

- In recent years, because of its tendency to regionalism and its characteristic propensity to stay with traditional Batch services, the German market has tended to stagnate in terms of innovation and interest for multi-national vendors interested in spreading into and throughout Europe.

- This is now changing, and the sheer size of the West German sector and its potential for development are causing a much more buoyant situation and awakening the interest of non-German companies in getting established there.

- Market sector growths are shown in Exhibit III-D.7.

THE WEST GERMAN COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977 **	1978 **	GROWTH 77 - 78 (%)	1979 *	1980 *	1981 *	1982 *	1983 *	AAGR (%)
RCS PROCESSING	118	167	42	217	265	323	394	481	22
BATCH SERVICES	354	505	43	636	789	947	1117	1285	19
SOFTWARE PRODUCTS	44	61	39	79	103	134	174	226	30
PROFESSIONAL SERVICES	156	203	30	254	299	356	428	517	19
ALL	672	936	39	1186	1456	1760	2113	2509	19

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

EXHIBIT III-D.7

BELGIUM/LUXEMBOURG

E. BELGIUM/LUXEMBOURG

(i) GEOGRAPHIC DIVISIONS

Belgium and Luxembourg have been divided into 11 regions, compatible with administrative Belgium, (see map - Exhibit III-E.1). A general breakdown of industrial and agricultural sectors is listed below.

Area 1 and 6: Brussels and environs

Brussels, capital of Belgium, the seat of Government; and now with both the headquarters of NATO and the European community in the capital, a European city as well as the principal commercial city of Belgium. There is a wide range of industrial activity in the Brussels area, the Automobile, Paper, Chemical, Machinery and Mechanical Engineering, Ceramics and Food Industries are all active in the area.

Area 2: Antwerp Area

Antwerp, the third largest seaport in continental Europe and the fourth largest in the world, handles 90% of all Belgian overseas trade. Centre of the diamond industry, which remains one of Belgium's most highly specialized sectors, it represents 3% of the country's total exports.

The area is heavily industrialised; besides ship-building there are extensive industrial complexes covering Machinery and Mechanical Engineering, Non-Ferrous metals, Chemical and Brewing industries.

Area 3: West Flanders

Bruges, the principal city of West Flanders, was at one time the principal port of Belgium. It is the centre of one of the principal agriculture areas of Belgium and has the channel ports of Ostend and Zeebrugge in the province.

The principal industries of the area are: glass and chemicals with some ship-building.

Area 4: East Flanders

Gent is the principal city of East Flanders and the centre of the textile industry of Belgium. There is also a thriving Leather industry and the surrounding areas are again like West Flanders, largely agrarian.

Area 5: Limburg

The least densely populated or industrialised part of Belgium, there is a growing area around Genk (on the Dutch border), a coal mining area, where there is a rapidly expanding industrial area which principally specialises in the Chemical and Metallurgical fields. The rest of the region is largely engaged in timber and agriculture.

Area 6: Brabant

See area 1.

Area 7: Hainaut

One of the heaviest industrial areas of Belgium, the mining steel industry and chemical industry occupying large areas of the province principally around the cities of Mons and Charleroi. Shape has also now its headquarters at Mons, making this the third international organisation to have its headquarters in Belgium. There is a large horticultural area around Tournai.

Area 8: Namur

Heavily agricultural with the tail end of the coal mines of both the Charleroi and Liege areas encroaching into the province and the lower reaches of the Ardennes starting into the east of the province.

Area 9: Liege Area

Liege, one of the heaviest industrial areas of Belgium, with an extensive coal mining area. The centre of the Belgian small arms industry and a thriving crystal and glass industry. All the principal industries are represented in this area, e.g. steel, chemical, rubber, textiles, food etc. There is also a thriving agriculture area around Verviers and Huy.

Area 10: Belgian Luxembourg

Apart from the coast, one of the principal tourist areas of Belgium, the Ardennes. Practically the entire upland area is covered in forest. There is a small area of industrial development at the southern most part of the province around Arlon, which has an extensive steel industry and links up with the great Lorraine steel basin of France.

Area 11: Duchy of Luxembourg

The Grand Duchy of Luxembourg covers an area of exactly 999 square miles and has a population of some 348,000 inhabitants. There is a dialect spoken by more that two-thirds of the population, Letzeburgesch but it is not generally used as a written language. The people are great linguists and English and French are understood and spoken by almost everyone.

Belgian money is accepted in Luxembourg. The main source of income comes from mining, blast furnaces and steel works, which are concentrated around Dudelange in the south-west corner of the Duchy and constitutes 70% of all exports. Other sources of income are agriculture and wine.

Luxembourg is a tax haven and the Secretariat of the European Parliament is based in the capital. For three months of the year the Council of the Ministers of the European Community also meet here.

GEOGRAPHIC DIVISIONS

MAP

1. Brussels Area
2. Antwerp Area
3. West Flanders
4. East Flanders
5. Limburg
6. Brabant
7. Hainaut
8. Namur
9. Liege Area
10. Belgian Luxembourg
11. Grand-Duchy of Luxembourg

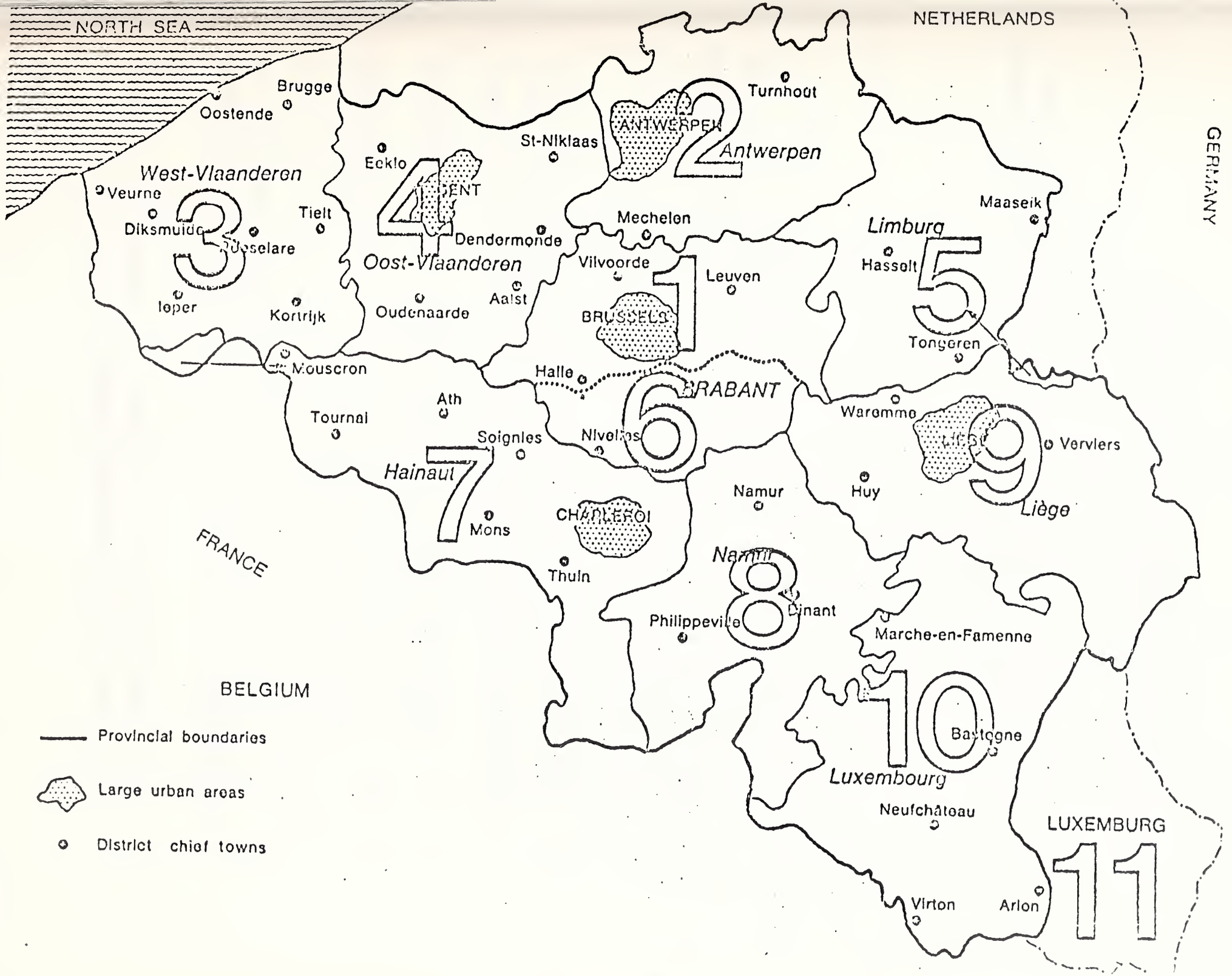


EXHIBIT III-E.1

BELGIUM/LUXEMBOURG

(ii) ECONOMIC DESCRIPTION

- Located as it is at the cross-roads of Western Europe's main lines of communication, close to the Rhine-Meuse-Scheldt delta, Belgium owes its status as an important industrial position to:

  - its favourable geographical position,
  - coal and iron deposits,
  - skilled manpower.

- Belgium has since 1921 been in an economic union with Luxembourg - the Belgo-Luxembourg Economic Union (B.L.E.U.). Since the B.L.E.U. accounts for between 3% and 4% of world trade, Belgium, as a trading nation, is very heavily dependent on the state of the world economy. The oil crisis of 1974, therefore disturbed the internal economy of the country and initiated a period of unemployment, inflation and slow growth in real terms.

- Some 40% of Belgian exports are to West Germany; the slow growth policy exercised in recent years by that country's government has caused a correspondingly slow recovery in the Belgian economy. This has been a period when:

  - Belgian government and trade sponsoring bodies have been seeking new markets particularly in the developing countries,
  - the private sector has had the opportunity to re-examine and overhaul business systems and methods.

- Exhibits III-E.2 (a) and (b) show certain basic economic indicators relating to the performance over the last ten years, of Belgium and Luxembourg, repectively.

- Gross National Product (GNP) has increased by an average 13% per annum in actual terms. In real terms growth has been minimal (between 1% and 3%).

BASIC ECONOMIC STATISTICS

BELGIUM

INDICATOR	YEAR 1970	1974	1978
GDP BFB	1,132	1,866	2,564
GDP $B**	29.75	49.0	78.40
Population (millions)			
- Total	9.65	9.79	9.95
- Total Working	3.83	3.99	4.08
Agriculture, etc.	0.17	0.14	0.12
Manufacturing	1.58	1.57	1.53
Service Industries	2.07	2.28	2.43
No. of organisations * (thousands)	-	-	148
No. of establishments * (thousands)	-	-	290

** At current exchange rates.

* These figures include the numbers engaged in agriculture, forestry and fishing.

SOURCES: Belgian N.I.S. and INPUT estimates

EXHIBIT III-E.2 (a)

BASIC ECONOMIC STATISTICS

LUXEMBOURG

INDICATOR	YEAR 1970	1974	1978
GDP FB	53	94	98
Population (millions)			
- Total	0.34	0.35	0.36
- Total Working	0.14	0.15	0.15
Agriculture, etc.	0.01	0.01	0.01
Manufacturing	0.06	0.07	0.07
Service Industries	0.06	0.07	0.07
No. of organisations * (thousands)	-	-	5
No. of establishments * (thousands)	-	-	11

* These figures include the numbers engaged in agriculture, forestry and fishing.

SOURCES: Luxembourg M.E.N. and INPUT estimates

EXHIBIT III-E.2 (b)

- Population increase has been at an annual average rate of around 0.4%. However, the working population has increased at the rate of 0.8% per annum, indicating in a time of increased unemployment and with an ageing population that the stagnant economy has given impetus to an increase in the number of bread-winners per family unit.

- Exhibit III-E.3 shows the spread of Belgian enterprises relating to size and industry.

- Belgium has a high proportion of organisations with more than one establishment. The ratio of establishments to organisations is 1.96 - higher than that in most other European countries.

- The standard of living and its cost are both high in Luxembourg. The per capita GDP is slightly higher than that of Belgium, - 280,000 Francs per head as against 265,000 in Belgium.

- Nevertheless the country is too small to contribute significantly to the overall Benelux computer services market.

(iii) COMPUTER SERVICES MARKET CHARACTERISTICS

- The Belgian and Luxembourg organisations are unique in Europe for their extreme tendency to contain the maximum proportion of their activities in-house, this is reflected in their low usage of external services ; only 33% of all large organisations use external services - other countries (except Germany) are above 40% and some are considerably higher (e.g. Norway 75%).

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

BELGIUM

ISIC Code	Industry	Enterprise by Size of Annual Turnover (BF)			
		Small 20M	Medium 20M to 2B	Large 2B	Total
11-13	Agriculture/Forestry/ Fishing	63,388	1,330	28	64,746
21-29	Mining/Quarrying	407	292	20	719
31	Food/Drink/Tobacco	2,350	125	14	2,489
32	Textiles/Clothing	1,373	180	8	1,561
33	Wood Products	400	32	5	437
34	Paper/Print/Publ.	465	200	5	670
35	Chem./Petroleum	112	273	40	425
36	Non-Metallic Prod.	3,307	170	17	3,494
37	Basic Metal	53	135	25	213
38-39	Fabricated Metal Prod.	3,037	250	71	3,358
41	Electricity/Gas	-	50	11	61
50	Construction	7,606	352	56	8,014
61-63	Wholesale/Retail	42,255	2,260	170	44,685
71-72	Transport/Comm.	9,508	955	55	10,518
81	Financial	-	150	33	183
82	Insurance	264	50	28	342
83	Business Services and Professions	5,810	226	24	6,060
91	Government	-	132	23	155
	TOTAL	140,335	7,162	633	148,130

SOURCE: INPUT Estimates

EXHIBIT III-E.3

- Consequently this is proportionally the smallest market for computer services in Western Europe. From an overall services market total of $150M in 1978 (INPUT estimate), $62M was generated from Batch Services and $44M from software and miscellaneous services. The Batch Services component of the market is expected to grow at an annual rate of 18% between 1978 and 1982 (see Exhibit III-E.4 for proportions of the Belgian market occupied by each computer service category and Exhibit III-E.5 for growth rates by type of service).

- The market for RCS services in 1978 was worth $44M - this being split $14M to Interactive and $30M Remote Batch. Growth in these two services is expected to be 24% and 12% respectively.

- Foreign-owned companies have a strong influence on the RCS markets: UCC (U.S.), IBM (U.S.), Burroughs (who operate a batch/remote batch bureau), CSC (U.S.), ADP (U.S.), COMSHARE (U.K./Canada), CEGOS-Tymshare (France), SIA-B (France).

- International operations, therefore, generate a high percentage of revenues (75%), particularly since the domestic suppliers, with the exception of CIG/GTS, are mainly small and privately held.

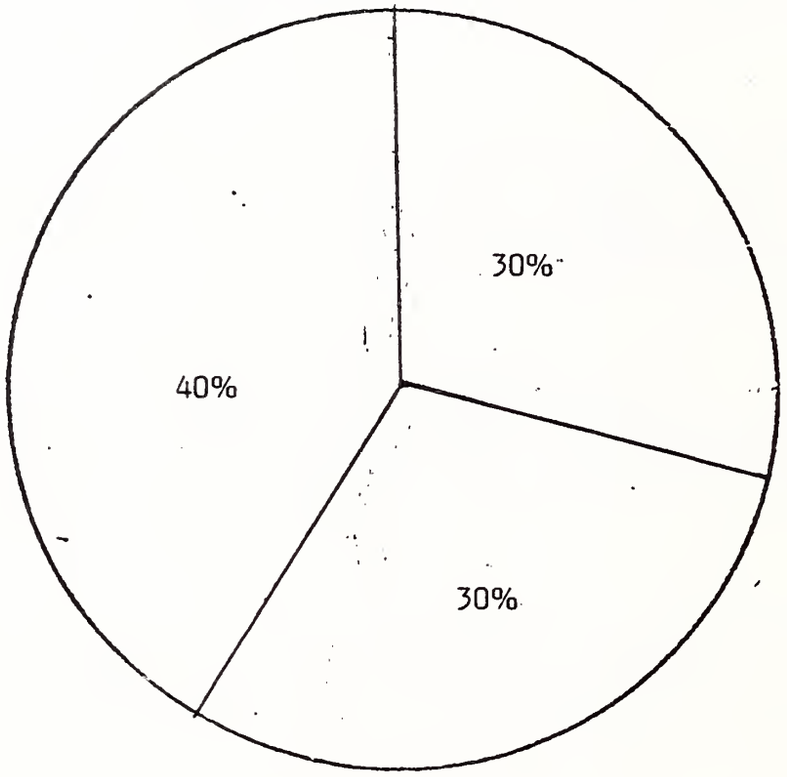
- International operations excepted, the domestic market is firmly entrenched in traditional, off-line data-entry/batch services (data preparation is a relatively good market in Belgium).

- De-centralisation of computing is a noticeable trend in large organisations but in Belgium they are opting for the in-house (DDP) approach. The forecast annual growth rate for Distributed systems is 40% over the next 2 years; this contrasts sharply with the 1% growth anticipated by large users for On-Site Services.

COMPUTER SERVICES MARKET 1978

BELGIUM/LUXEMBBURG

ALL VENDORS

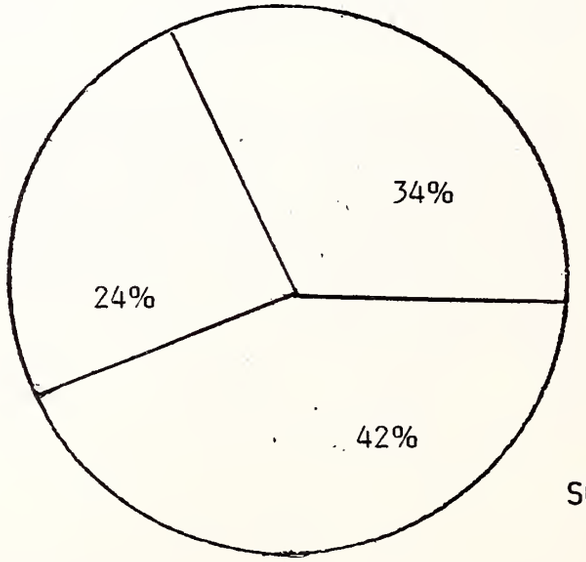


BATCH SERVICES

RCS

SOFTWARE AND PROFESSIONAL SERVICES

THE TOP TEN



BATCH

RCS

SOFTWARE ETC.

EXHIBIT III- E4

BELGIUM/LUXEMBOURG COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M*	%	$M*	%	
RCS PROCESSING	37	28	62	30	67
BATCH SERVICES	61	47	84	41	38
SOFTWARE PRODUCTS	5	4	8	4	60
PROFESSIONAL SERVICES	28	21	53	25	89
TOTAL	131	100	207	100	58

SOURCE: CAMP/EUROPE AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES.

EXHIBIT III-E.5

(iv) SUPPLIERS AND COMPETITION

- IBM is the leading computer services vendor for all three types of services. In each case IBM has a clear lead (measured in terms of accounts held) and is one of the few vendors offering all three services. The others are Sligos, SATI and CIG/GTS.

- The top computer services companies are shown for all three services in Exhibit III-E.6.

- The leading multiservice vendors each have a dominance in specific industries

IBM	-	Wood products Chemicals/petrol/coal Insurance
SLIGOS	-	Food/drink
SATI	-	Paper/printing/publishing

- No fewer than 43 vendors compete for the Batch services market, however only 12 of these have more than one account. Consequently few vendors are significant in more than one industry sector. Those that do are:

IBM	-	Chemicals/petrol/coal Basic metal Wholesale/retail Insurance Financial institutions
SLIGOS	-	Food/drink/tobacco Chemicals/petrol/coal
ASSUBEL	-	Financial Institutions Business services

BELGIAN TOP TEN COMPUTING SERVICES VENDORS 1978/9

RANK	VENDOR	REVENUE IN MILLIONS OF BELGIAN FRANCS (MBF)			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	CIG	273	200	287	760
2	IBM	153	261	41	455
3	SLIGOS	109	61	140	310
4	ORDA-B	52	82	66	200
5 =	SOBEMAP	-	-	180	180
5 =	GTS	-	180	-	180
7	CDC	34	119	17	170
8	STERIABEL	-	-	168	168
9	SGAB	48	16	96	160
10	EFFICIENT SA	-	-	150	150

EXHIBIT III-E.6

- Some clearly are industry specialised Batch/Remote Batch vendors, these are Fabrimetal (Fabricated metal products), Kredit Bank (Financial institutions) and Petrofina (Chemical/petroleum).

- In the Interactive services market each of the top vendors dominates one or more industry sectors. IBM is a clear or joint leader in 6 industries and GTS in 4. The top four vendors compete strongly with each other in the richer industry sectors i.e. Food/drink, Chemicals/petroleum and Financial institutions.

(v) COMPUTER SERVICES MARKET FORECASTS BY TYPE OF SERVICE

- Exhibit III-E.7 shows the computer services market from 1979 - 1983 inclusive, broken down by type of service.

THE BELGIUM/LUXEMBOURG COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977 **	1978 **	GROWTH 77 - 78 (%)	1979 *	1980 *	1981 *	1982 *	1983 *	AAGR (%)
RCS PROCESSING	37	62	67	84	107	134	161	190	23
BATCH SERVICES	61	84	38	101	116	130	144	156	11
SOFTWARE PRODUCTS	5	8	60	11	14	18	21	25	23
PROFESSIONAL SERVICES	28	53	89	77	100	125	150	177	23
ALL	131	207	58	273	337	407	476	548	19

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

EXHIBIT III-E.7

NETHERLANDS

F. NETHERLANDS

(i) GEOGRAPHICAL DIVISIONS

The Netherlands has an area of 15,900 square miles and much of the land is devoted to agriculture in its various branches. About 40% of the country is below sea level and protected by dykes; land reclamation is still in progress, e.g., Delta Works in Zeeland and the reclamation of the former Zuider Zee, now known as Ijsselmeer.

The population of the Netherlands is 14 million, and of those 50% live in the area known as the 'Randstad' which is broadly the triangle formed by Amsterdam, Utrecht, Rotterdam and The Hague.

The country is well served by motorways, 32.5 kilometers of motorways compared with 17.8 in West Germany.

The main international airport is at Schiphol near Amsterdam with a smaller airport at Rotterdam, there is a good internal domestic service linking Amsterdam, Enschede, Eindhoven, Maastricht, Groningen and Leeuwarchen; and an excellent railway network.

The country is divided into 11 provinces.

1. NORTH HOLLAND

The principal city of North Holland is Amsterdam, capital of The Netherlands and second port. The port is linked to the North Sea by a 15 mile canal ending at the coast at Ijmuiden, which has the largest lock systems in the world.

The largest Dutch steel concern is also at Ijmuiden.

The Diamond Industry has its centre here in Amsterdam.

All major industries are active in the areas around Amsterdam, i.e. shipbuilding, engineering, pharmaceuticals and plastics and a wide range of light industry.

This province is also the centre to the bulb growing area, Haarlem being the principal centre.

2. SOUTH HOLLAND

One of the principal cities of the Netherlands, Rotterdam, which is one of the largest Ports of the world, is in this province, with its extensive area of oil refineries centered at the area known as Europort. Shell, Esso, Chevron and Gulf Oil are all represented; the whole area is highly industrialised, most areas of industry being here. Unilever has its main centre in Rotterdam and Shell certain of its main branches, e.g., trading.

The Hague is in this province and is also the seat of the government. The International Court of Justice has its headquarters here.

Shell has its main Dutch office in The Hague.

The Dutch has a comparatively large merchant fleet (11th of the world list) which has also influenced port construction at Europort. There is also an extensive inland water transport fleet the Rhine being navigable up to Basle from Rotterdam.

Scheveningen near The Hague is one of the largest fishing ports of Europe.

Note: These two provinces are what really to a Dutchman is the area known as Holland, the rest of the country is the Netherlands.

3. UTRECHT

The smallest province of Holland, heavily industralised but also an extensive agricultural area. All industries are represented. These three provinces are in reality the Randstad, Utrecht being the third city of the Netherlands.

4. ZEELAND

Centre of the Delta Works the project to close off the estuaries of the Rhine, Waal and the Scheldt; two inlets are being left open to the North Sea - the canal from the Hook of Holland to Rotterdam (the Nieuwe Waterweg) and the Western Scheldt which gives access to Antwerp.

The work started in February 1957 and is now nearing completion.

Flushing is also an important port and fishing port.

5. NORTH BRABANT

The provincial capital of this province is s'Hertogenbosch (Den Bosch) but the main centre of industrial activity is Eindhoven, the home of Philips, fifteenth in the world ranking list. Philips is Dutch owned as compared with Unilever, which is 50% Dutch and 50% British, and Shell 51% Dutch, 49% British. This is also the main centre of the Dutch car industry, Daf and Volvo being based here. Like all parts of the Netherlands most branches of agriculture are practised here.

6. LIMBURG

Capital of the province is Maastricht; at one time this was the centre of the Dutch mining industry. Most of the mines are now closed but have been replaced by the chemical industry. The former Dutch State Mines, DSM, has its headquarters at Heerlen and is still the sixth largest Dutch industrial company having diversified into many areas. There is also a ceramic and glass industry centred around Maastricht - as the rest of the Netherlands the land is devoted to all branches of agriculture.

7. & 8. GELDERLAND AND OVERIJSSEL

The provincial capital of Gelderland is Arnhem and of Overijssel Zwolle. Akzo, the fourth largest Dutch company has its headquarters in Arnhem, one of the largest Dutch chemical and allied product firms in the country: Hengelo is also the centre of a highly industrial area. Both these provinces are highly agriculturised.

9. & 10. DRENTE AND FRIESLAND

Largest towns in these provinces are Drente, Assen, and Friesland, Leeuwarden. There are large oil fields in Drente and most areas of industry are present in the province, the Nederlandse Aardolie Mij has its headquarters in Assen. Friesland is the most highly agriculturised province of the Netherlands with small pockets of industry.

11. GRONINGEN

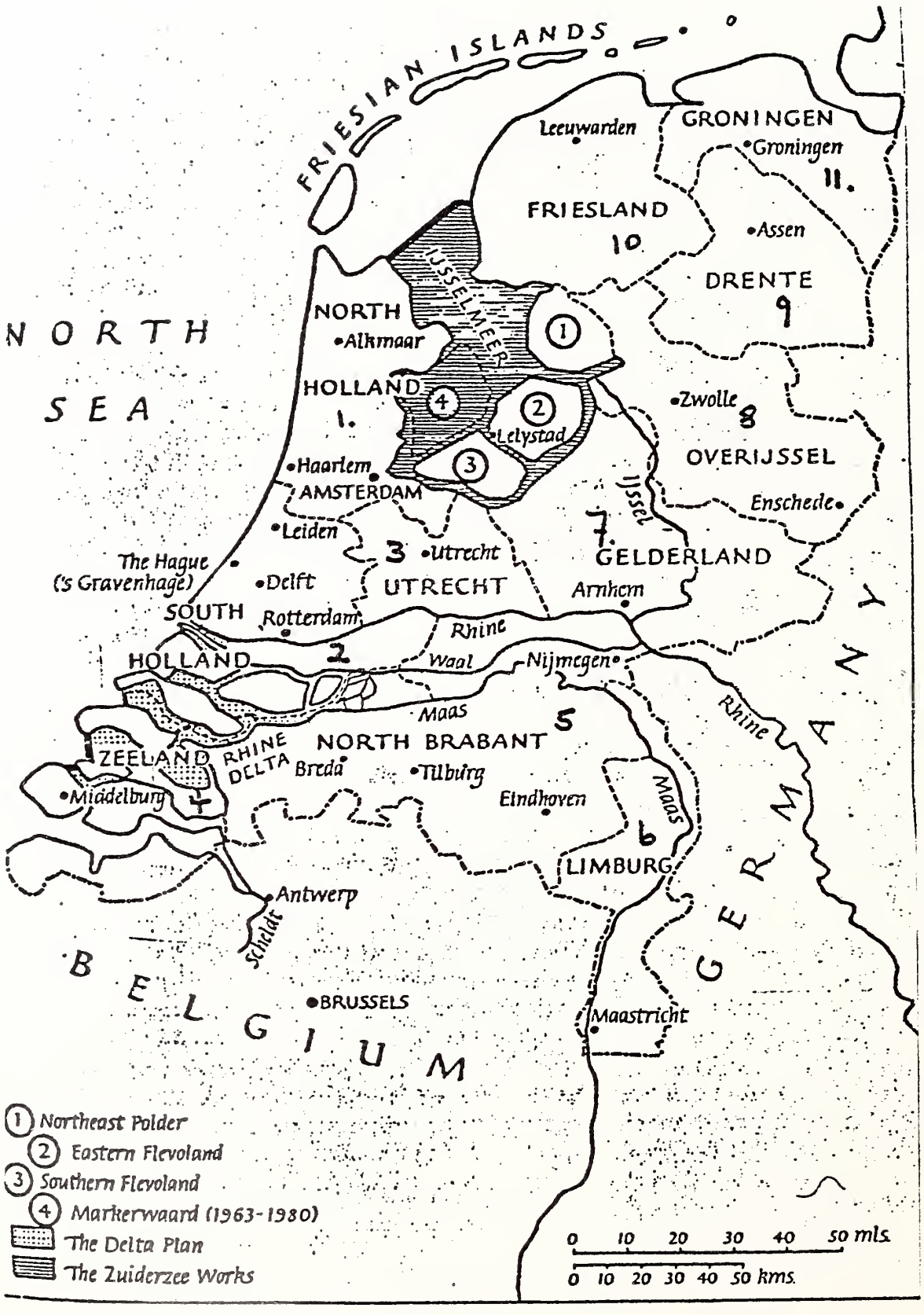
Natural Gas was discovered in the province in 1960 at Slocteren and an industrial area was formed around Groningen to exploit and support this find. There is also an aluminium, chemical industry here, otherwise most of the province is devoted to agriculture.

GEOGRAPHIC DIVISIONS

MAP

1. NORTH HOLLAND
2. SOUTH HOLLAND
3. UTRECHT
4. ZEELAND
5. NORTH BRABANT
6. LIMBURG
7. GELDERLAND
8. OVERIJSSEL
9. DRENTHE
10. FRIESLAND
11. GRONINGEN

THE NETHERLANDS



(ii) ECONOMIC DESCRIPTION

- Until the last year or two the Dutch economy has grown steadily since the 1960s, underpinned by the North Sea natural gas revenues and the boost which they gave to the country's confidence in its future. As well as steady growth, the government was also reporting a controlled inflation rate. Recent analyses of the economy, however, have identified long term structural problems. During the 1970s the manufacturing base has not grown fast enough to provide a platform for the increased social services costs. A deficit has occurred which has been filled by taxing away profitability causing further loss of investment capability.

- These problems are being addressed by the government and plans are being laid down to take the Dutch economy through into the "post-natural gas" period. A first objective is to achieve a balance of payments surplus; (Dutch imports for 1977 and 1978 exceeded exports by 1% and 3% respectively).

- The economy's dependence on foreign trade is very heavy, only a minimum of raw materials being available from within the country. In fact, exports per capita are the second highest in the world, after Belgium's.

- Exhibit III-F.2 shows some basic economic indicators relating to the country's performance in the immediate past.

- Gross National Product has increased by an average 11.5% per annum since 1965, when taken at market prices. In real terms growth has been lower at 4% over the same period, and at the even slower rate of 3% per annum since 1975.

- The increase in population since 1965 has been at the annual rate of 0.9%, and has again been even slower since 1975 with a rate of 0.7%. At the same time, the two sections of the population aged (a) between 20 and 64, and (b) 65 and over have increased at above average rates of 1.5% and 2.2% per annum for the twelve years from 1965 to 1977. This indicates a marked trend towards fewer people supporting an increasingly aged and leisured community.

BASIC ECONOMIC STATISTICS

NETHERLANDS

INDICATOR		YEAR 1977	1978
GDP	fl. B	232.1	250.4
	$B**	94.35	110.31
Population (millions)			
- Total		13.90	14.00
- Total Working		5.39	5.38
Agriculture, etc.		0.34	0.33
Manufacturing		1.75	1.72
Service Industries		3.30	3.34
No. of organisations * (thousands)		-	169
No. of establishments * (thousands)		-	310

\+ At market prices

** At current exchange rates

* These figures include the numbers engaged in agriculture, forestry and fishing, but exclude businesses run from home premises.

SOURCES: Amro Bank and INPUT estimates

EXHIBIT III-F.2

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

NETHERLANDS

ISIC Code	Industry	Enterprise by Size of Annual Turnover (fl.)			
		1.0M	1.0 - 100M	100M	Total
11 - 13	Agriculture/Forestry/ Fishing,	65,000	1,450	50	66,500
21 - 29	Mining/Quarrying	600	300	25	925
31 - 39	Manufacturing	12,500	3,150	260	15,910
41	Electricity/Gas etc.	-	100	20	120
50	Construction	10,000	500	50	10,500
61 - 63	Wholesale/Retail	50,050	3,100	150	53,300
71 - 72	Transport/Comm	11,050	1,245	30	12,325
81	Financial	150	200	40	390
82	Insurance	50	135	25	210
83	Business Services/ Professions	8,000	400	100	8,500
91	Government	-	250	50	300
	TOTAL	157,400	10,830	800	169,030

EXHIBIT III-F.3

- The Netherlands contains 169 thousand enterprises operating from approximately 310 thousand establishments.

- Exhibit III-F.3 shows the spread of Dutch enterprises by size and industry.

(iii) COMPUTER SERVICES MARKET CHARACTERISTICS

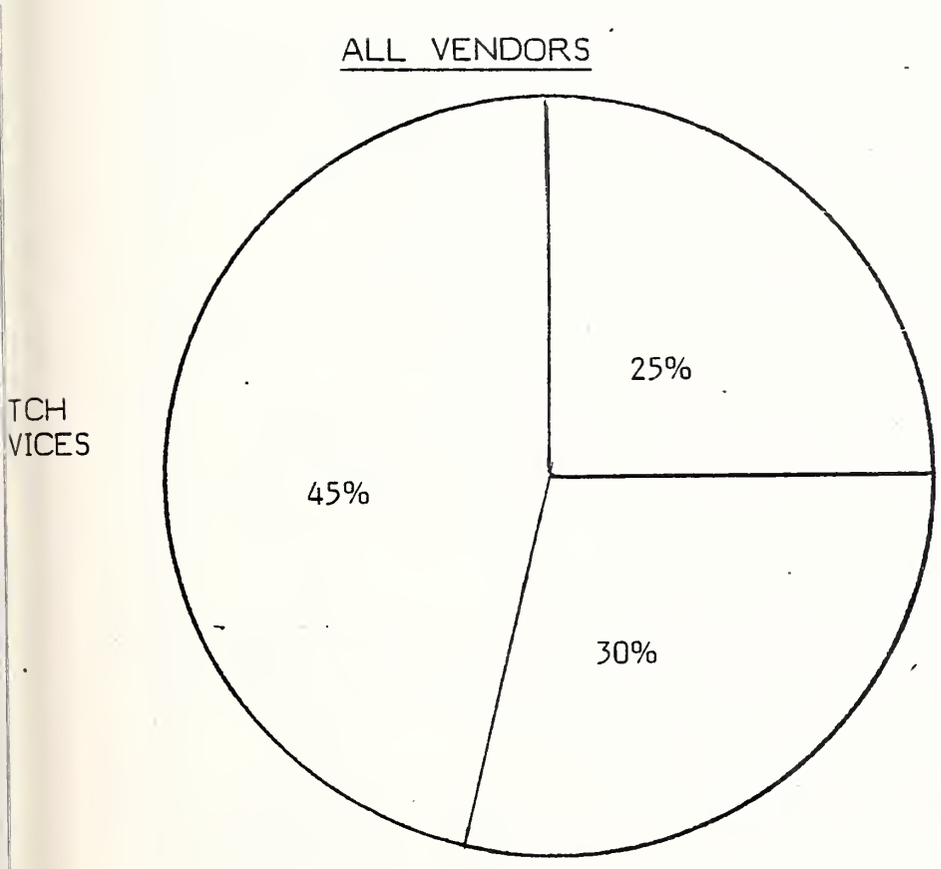
- The Dutch market for all computer services is of significant size in Europe; it being in 1978 45% of the size of the UK market and 25% of the size of the French market. Due to the open minded and free trading nature of the market it is well developed by strong competition between Dutch national, other European and US vendors; between them they have created a market which is as well, or better, covered than any other comparable European country.

- Five aspects, all of them positive, make the Netherlands an attractive market for the RCS vendor; profits from holding companies established there can be transferred out of the country without local taxes being applied; the Dutch are bi-, tri- or quadri-lingual, dependable and uncomplicated; communications costs are very low and of good quality; the road network and air routes afford excellent mobility; the Netherlands are centrally situated with respect to all of the other Western European countries.

- Despite its relatively small size, the Dutch market is expected to grow in line with most other European countries. Continuation of the thorough coverage and strong competition between vendors will give rise to a growth rate of (1978-1982) 14% for Batch Services, 10% for Remote Batch Services and 25% for Interactive Services. The demand for User Site Computing Services already exceeds these figures in large organisations; they are estimating a 31% annual growth rate over the next 2 years.

- Exhibit III-F.4 shows the proportions of the Dutch market occupied by each computer service category, and Exhibit III-F.5 gives growth rates, by type of service.

COMPUTER SERVICES MARKET 1978



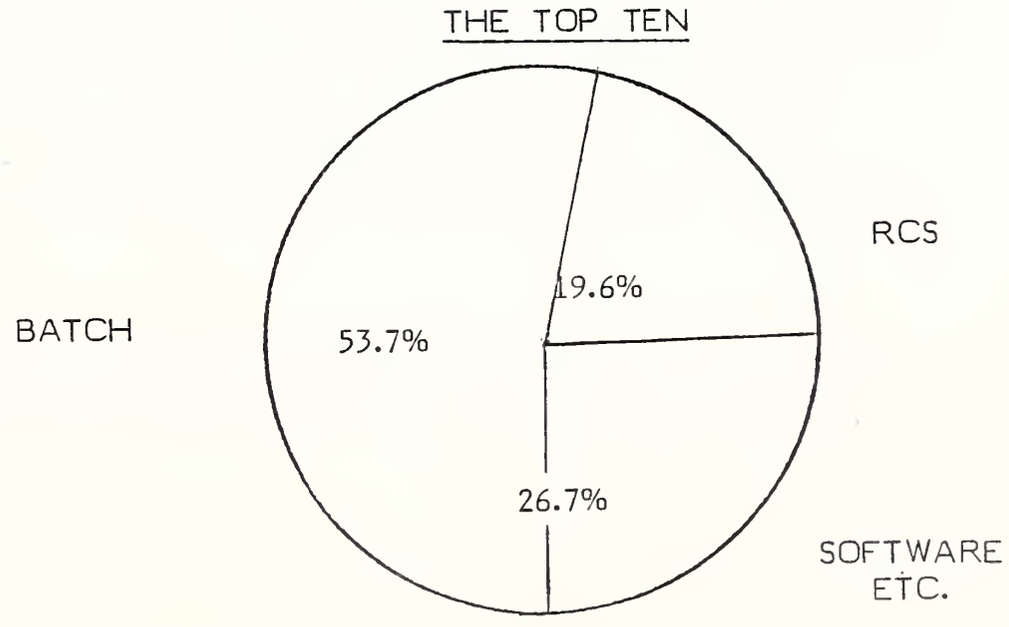


EXHIBIT III-F.4

THE NETHERLANDS COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M *	%	$M *	%	
RCS PROCESSING	53	23	80	25	51
BATCH SERVICES	111	48	142	45	30
SOFTWARE PRODUCTS	10	4	17	5	70
PROFESSIONAL SERVICES	58	25	80	25	40
TOTAL	232	100	319	100	38

SOURCE: CAMP/EUROPE AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES

EXHIBIT III-F.5

- The majority of clients lie around and in the area between Amsterdam, The Hague, and Rotterdam, including the cities of Utrecht and Hilversum. Companies in those cities have a contiguous area of 50km diameter that encompasses 75% of the Dutch prospects.

- The sales by region in 1977 were as follows:

-	Den Haag (The Hague)	30%
-	Amsterdam	30%
-	Rotterdam	25%
-	all other	15%

The investment policy of the Dutch Government is encouraging faster growth in the "other" areas, but the above distribution will not change dramatically in the next five years.

- The Netherlands is the second highest user of external services overall particularly of Remote Computing Services.

- Growth in Batch Services will be less encouraging, especially in the large organisation sector where demand will decline.

- The Netherlands is the second best growth prospect in Western Europe for User Site Services counter-balanced by being second lowest prospect for Distributed Processing.

- Dutch large organisations are the third lowest users of in house computers in Western Europe.

- As in all other countries the most popular two application areas for future development are Production/Stock Control and Financial Analysis/Planning.

(iv) SUPPLIERS AND COMPETITION

- Dutch companies feature prominently in the leading suppliers of BATCH SERVICES to large organisations. This is not the case for Remote Batch and Interactive services where US-owned multi-national vendors dominate.

- The market for Batch Services was $108M in 1978 and demand will grow at an average of 14% per annum until 1982 when the market value will be $182M (INPUT estimates).

- Exhibit III-F.6 lists the 10 vendors which are currently leading in the provision of Batch Services to the large organisations sector of the total market. Note that the sequence of vendors in this list has been determined by number of accounts without reference to their value.

- IBM is the market leader with 26% of all accounts recorded against identified vendors in the survey. (46% of accounts recorded were with un-identified vendors). ACD and ARC, the next most successful vendors, each house around half the number of accounts held by IBM.

- The Batch Services division of GEIS is the sixth vendor and is the sole supplier to each of its customers.

- The REMOTE BATCH SERVICES market was $143M in 1978 and will grow at the rate of 10% to $63M in 1982 (INPUT estimates).

- The top four vendors including Comshare are all US owned multinational service companies.

- The INTERACTIVE SERVICES market was $19M in 1978 and will grow at the rate of 25% to $46M in 1982.

THE NETHERLANDS TOP TEN COMPUTING SERVICES VENDORS - 1978

SOURCE: CAMP/EUROPE

RANK	VENDOR	REVENUE IN MILLIONS OF DUTCH GUILDERS (fl. M)			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	CENTRAL BEHEER CEA (AND CSR)	38.0	4.0	5.0	47.0
2	CVI	34.0	6.8	4.6	45.4
3	ARSYCOM	8.0	3.0	19.0	30.0
4=	CCN	12.5	7.4	5.1	25.0
4=	RAET	13.8	4.8	6.4	25.0
6	CMG	3.8	1.1	18.4	23.3
7	SAMSOM	10.9	1.1	10.9	22.9
8	ARC	19.8	1.1	1.1	22.0
9=	ACD	10.0	6.2	5.4	21.6
9=	IBM	1.6	20.0	-	21.6

EXHIBIT III-F.6

(v) COMPUTER SERVICES MARKETS BY TYPE OF SERVICE

- Exhibit III-F.7 shows a breakdown by type of service of the computer services market from 1979 to 1983 inclusive.

THE NETHERLANDS COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977 **	1978 **	GROWTH 77 - 78 (%)	1979 *	1980 *	1981 *	1982 *	1983 *	AAGR (%)
RCS PROCESSING	53	80	51	108	129	154	185	221	20
BATCH SERVICES	111	142	30	192	228	270	320	332	15
SOFTWARE PRODUCTS	10	17	70	26	34	44	55	71	28
PROFESSIONAL SERVICES	58	80	40	116	142	173	211	253	21
ALL	232	319	38	442	533	641	771	877	19

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

EXHIBIT III-F.7

SCANDINAVIA

G. SCANDINAVIA (SWEDEN, NORWAY, DENMARK, FINLAND)

(i) ECONOMIC DESCRIPTION

- In the last six years the Swedish economy has grown at an average rate of 2.2% (at constant prices); this is a slower rate than the 3.6% of the 1960's. However, productivity has kept pace with inflation and working hours have undergone a steady decline.

- Norway has started to become one of the richest countries in the world on a per capita basis. For some years, it has enjoyed a stable but finely balanced economy which has been gradually moving from its traditional role as a supplier of primary products (fish, timber, metal ores) over to a diversified economy in which manufacturing and processing industries feature. The country has massive oil reserves, which will ensure that further growth continues.

- Denmark's economy has been in trouble of recent years, due to its high rate of inflation fuelled by overlarge social costs reducing its competitiveness in international markets. Expansion in real GDP has been around the 2% mark for the immediate past. Austerity measures have been introduced to combat the worsening balance of payments.

- Finland has had a virtually static economy in recent years, but this has improved rather than harmed the prospects for computer services.

- Exhibit III-G.1 shows some basic economic indicators relating to Scandinavia's performance in the immediate past.

- The increase in population since 1967 has been at the annual rate of 0.48%. Unemployment varies in the different countries. Finland and Denmark have high rates of unemployment while Norway has one of the lowest in Europe.

BASIC ECONOMIC STATISTICS

SCANDINAVIA

INDICATOR		YEAR	
		1977	1978
GDP + ($B)	Denmark	52.51	56.34
	Finland	25.35	25.82
	Norway	40.00	42.20
	Sweden	78.77	84.84
	Scandinavia	196.63	209.20
Population (millions) - Total	Denmark	5.08	5.10
	Finland	4.81	4.83
	Norway	4.15	4.19
	Sweden	8.27	8.29
	Scandinavia	22.31	22.41
- Total Working		10.04	10.12
Agriculture, etc.		0.70	0.67
Manufacturing		3.63	3.61
Service Industries		5.71	5.84
No. of organisations * (thousands)		-	669,500
No. of establishments * (thousands)		-	808,000

\+ At market prices and current exchange rates

* These figures include the numbers engaged in agriculture, forestry and fishing, but exclude businesses run from home premises.

SOURCES: National Statistical Institutes and INPUT estimates

EXHIBIT III-G.1

DISTRIBUTION OF ENTERPRISES BY SIZE AND INDUSTRY

SCANDINAVIA

ISIC Code	Industry	Enterprise by Size of Annual Turnover ($)			
		1.0M	1.0 - 10M	10M	Total
11 - 13	Agriculture/Forestry/ Fishing,	152,815	13,350	85	166,250
21 - 29	Mining/Quarrying	390	800	10	1,200
31 - 39	Manufacturing	48,200	24,100	800	73,100
41	Electricity/Gas etc.	2,990	910	40	3,940
50	Construction	72,885	10,290	255	83,430
61 - 63	Wholesale/Retail	103,750	22,300	350	126,400
71 - 72	Transport/Communications	68,900	20,300	150	89,350
81	Financial	75	1,045	60	1,180
82	Insurance	-	620	65	685
83	Business Services/ Professions	52,455	12,615	45	65,115
91	Government	39,180	19,590	100	58,870
	TOTAL	541,640	125,920	1,960	669,520

EXHIBIT III-G.2

- Scandinavia contains 669 thousand enterprises operating from over 800 thousand establishments. A breakdown of enterprises by size and industry category (ISIC) is shown at Exhibit III-G.2.

(ii) COMPUTER SERVICES MARKET CHARACTERISTICS

- The total Computer Services market for Scandinavia in 1978 amounted to $885M at 1978 dollar exchange rates. Exhibit III-G.3 gives the percentage breakdown by type of service.

- During the year the market continued to grow, showing an overall growth over 1977 revenues of 19%. This figure is considerably lower than the growth rates experienced in the major European country markets. While reflecting the deeper penetration of the Nordic Services industry into the respective national economies, it should be noted that it is higher than the rates of 11% and 12% being quoted by observers in 1977. This acceleration of the growth pattern has been due to the upsurge in the mini-computer based turnkey and professional services sector, and is expected to hold during the forecast period.

- Growth rates in the Nordic countries have not been inflated by dollar depreciation during 1978. Only in Denmark has an appreciable change in the exchange rate taken place.

- Exhibit III-G.4 shows the growth between 1977 and 1978 in terms of the different types of services sold.

1. Processing Services

- Work completed in Batch mode, defined to include off-line Data Preparation and Encoding, remained as the single largest revenue earning service at 51% of the total, or $450M, down in percentage terms since 1977 when it stood at 54%.

- Remote Computing, including Interactive and Remote Batch, accounted for 21% of revenues, approximately the same percentage as in 1977.

THE SCANDINAVIAN COMPUTER SERVICES MARKET 1978

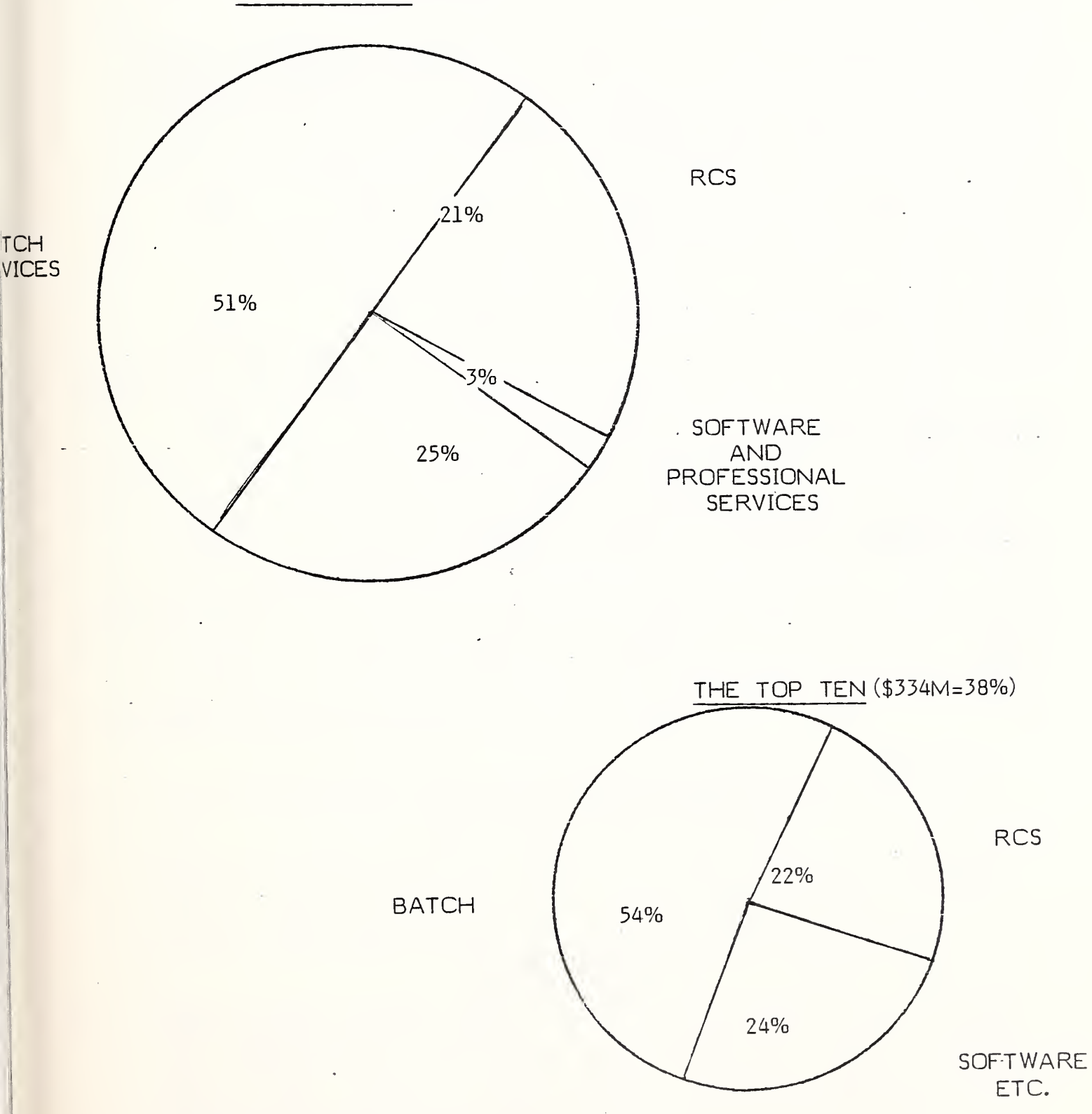


EXHIBIT III-G.3

THE SCANDINAVIAN COMPUTER SERVICES MARKET SIZES, 1977 AND 1978

TYPE OF SERVICE	1977		1978		AVERAGE ANNUAL GROWTH RATE %
	$M *	%	$M *	%	
RCS PROCESSING	154	21	185	21	20%
BATCH SERVICES	404	54	450	51	11%
SOFTWARE PRODUCTS	18	2	25	3	39%
PROFESSIONAL SERVICES	169	23	225	25	33%
TOTAL	745	100	885	100	19%

SOURCE: EDP 5000 USER RESEARCH AND INPUT ESTIMATES

* AT CURRENT EXCHANGE RATES

EXHIBIT III-G.4

2. Software Products

- The growth of software product sales is strong in Scandinavia at 39% between 1977 and 1978. Such a high growth rate is not expected to continue at this level, but because of its relative lack of development the sector will lead the growth rate chart for the forecast period.

3. Professional Services

- Growth in absolute terms between 1977 and 1978 was up from $169 million to $225 million, a 33% increase. Professional Services are expected to continue at this level of growth; any decrease in tailored systems market share being taken up by increases in:

  - consultancy, education and turnkey systems.

(iii) SUPPLIERS AND COMPETITION

- In SWEDEN Datema is a clear leader for Batch, Remote Batch and Interactive services; only in the Interactive services market is Datema a marginal leader (over GEIS and IBM). (See Exhibit III-G.5).

- Datema is in the strongest position in Sweden for Batch services in the Food/Drink, Metal Manufacturing, Construction, Wholesale/Retail and Financial Institutions/Business Services sectors.

- Only one other supplier in the top ten provides all three services, namely CDC.

- In Remote Computing Services (Remote Batch and Interactive), Datema and CDC are accompanied in the top ten by Bonnier Data and SSAB. With the addition of IBM, these are also the top suppliers of Interactive services.

- Datema is the strongest supplier of Remote Batch services in Food/Drink, Metal Manufacturing, Construction and Wholesale/Retail - a nearly complete subset of their activites in Batch services. CDC are strongest in Chemicals/Petrochemicals, Transport/Storage and Financial/Business services.

THE TOP TEN COMPUTING SERVICES VENDORS

IN SWEDEN AND DENMARK 1978

RANK	VENDOR	REVENUE IN MILLIONS OF DOLLARS ($M)*			
		BATCH	RCS	SOFTWARE & PROFESSIONAL	ALL SERVICES TOTAL
1	KOMMUNEDATA	30.0	12.0	18.0	60.0
2	DATEMA	32.0	7.1	20.1	59.2
3	DATACENTRALEN	22.8	8.9	13.0	44.7
4	SPADAB	20.5	9.1	9.0	38.6
5	KOMMUN DATA	20.0	6.4	5.4	31.8
6	DAFA	14.0	10.4	1.6	26.0
7	IBM	9.9	10.6	3.5	24.0
8=	JDC DATA	10.0	2.0	8.0	20.0
8=	RC DATA	16.0	2.0	2.0	20.0
10	CDC	4.0	5.0	1.0	10.0

SOURCE : MAS/EUROPE

* AT 1978 EXCHANGE RATES

- GEIS and Datema alternate in their dominance of industrial sectors, in particular:

GEIS	-	Chemicals/Petroch.	Datema	-	Paper/Printing
		Wholesale/Retail			Metal Manufacturing

- GEIS is prominent in Mining/Quarrying, Food/Drink and Basic Metal, each of these sectors showing no significant activity by Datema. In turn, Datema is active in Metal Manufacturing and Transport/Storage where GEIS has no significant presence.

- IBM's dominance is limited to the Food/Drink, Basic Metal and Financial/Business Services sectors.

- Other suppliers are prominent in one sector only, for example:

-	SSAB	-	Mining/Quarrying
-	Multidata	-	Textile/Clothing
-	Kraftdata	-	Gas/Electricity

- In NORWAY, there is no overall market leader providing all services as in Sweden; indeed, Datema although second to GEIS in Interactive services has no reported activity in Batch Services and one account for Remote Batch services. Only four companies in the top ten, in addition to Datema, supply two services. They are EDB (Batch and Remote Batch), Fjerndata (Remote Batch and Interactive), Computas and Teamco.

- There is a fairly close correlation of predominant suppliers of Batch and Remote Batch and industry sectors among the top ten, the most noticeable being:

-	Landbrukets	-	Food/Drink (agricultural aspects)
-	EDB	-	Paper/Printing
-	Datajenste	-	Non Metallic

For Interactive and Remote Batch, Fjerndata are the strongest suppliers to the Metal Manufacturing sector.

- GEIS is the dominant supplier of Interactive Services to the Mining/Quarrying, Paper/Printing and Financial/Business Services sectors. Fjerndata are ahead of GEIS in Metal Manufacturing.

- GEIS is well ahead of the nearest competitor Datema, their number of accounts in the sample being 47 and 26 respectively.

- Datema supplies Interactive Services mainly (and in order of number of accounts) to the Basic Metal, Chemical/Petroleum, Paper/Printing and Financial/Business Services industries.

- IBM has 21 accounts in the sample and dominates only in the Wood Products industry with a significant presence in Mining/Quarrying.

- Apart from GEIS, Datema and IBM, the only other suppliers of significance in supplying Interactive Services are Fjerndata (Metal Manufacturing), Tronderdata (Wholesale/Retail) and Data Drift.

(iv) COMPUTER SERVICES MARKET FORECASTS BY TYPE OF SERVICE

- Exhibit III-G.6 gives INPUT's five-year forward forecast to 1983.

- Batch Services are expected to go into decline towards the end of the forecast period, while at the same time RCS will plateau out.

- Software Products and Professional Services (including Turnkey and Hardware Maintenance Services) provide steady growth throughout the period reflecting the increasing hardware preoccupation of the leading services vendors.

THE SCANDINAVIAN COMPUTER SERVICES MARKET
- FORECASTS BY TYPE OF SERVICE, 1979 - 1983

TYPE OF SERVICE	MARKET FORECASTS IN $ MILLIONS								
	1977**	1978**	GROWTH 77 - 78 (%)	1979*	1980*	1981*	1982*	1983*	AAGR (%)
RCS PROCESSING	154	185	20	226	278	342	424	521	23
BATCH SERVICES	404	450	11	494	538	582	622	653	7
SOFTWARE PRODUCTS	18	25	39	35	49	68	91	118	36
PROFESSIONAL SERVICES	169	225	33	293	381	495	649	843	30
ALL	745	885	19	1048	1246	1487	1786	2135	19

* = CONSTANT 1979 DOLLARS; ** = CURRENT EXCHANGE RATES

EXHIBIT III-G.6

ITALY, SWITZERLAND, AUSTRIA

H. OTHER MARKETS

(i) ITALY

- In 1978, the Italian market was $429M, the fourth largest market in Europe. This value does not include captive revenues.

- Over 1,150 computer services companies were identified in INPUT CAMP/Italy research, half of which have less than ten employees.

- The largest computer services companies offering RCS services are (in order of overall revenue):

  - Datamont ($22.3M)
  - IBM ($21.2M)
  - Data Management ($17.0M)
  - GE-DA ($10.0M)

- The companies which have the largest RCS revenues are IBM, Datamont, GEIS and CDC (see Exhibit III-H.1).

- The Italian RCS market was only 11% of the total of $429 million in 1978 - nearly two and one half times smaller than the proportion found in other countries.

- IBM has made an important effort towards improving the RCS service and has narrowed the gap with GEIS in interactive services.

- DATAMONT provides 90% of its services to the Montedison group and only 10% to other commercial entities.

THE TOP REMOTE COMPUTING SERVICES VENDORS IN ITALY 1978

RCS RANK	COMPANY	RCS SERVICES ($ MILLION)			ALL SERVICES TOTAL ($M)
		REMOTE BATCH	INTERACTIVE	TOTAL	
1	IBM	9.3 *	5.9 *	15.2 *	21.2 *
2	HIS	+ *	6.1 *	6.1 *	6.1 *
3	DATAMONT	5.1	1.4	6.5 *	22.3
4	CDC	4.2 *	0.3 *	4.5 *	4.5 *
5	DATA MANAGEMENT	2.7	+	2.7 *	17.0
6	GE-DA	2.2	-	2.2 *	10.0
7	SE-DA	1.8	-	1.8 *	1.8
8	ADP	-	1.4 *	1.4 *	1.4 *

SOURCE: INPUT CAMP/EUROPE 1979

NOTE:

* INPUT ESTIMATE

\+ SMALL VALUE

CAPTIVE REVENUES WHERE KNOWN ARE OMITTED.

EXHIBIT III-H.1

- ADP-Cyphernetics is now one of the main interactive services vendors active in Italy, with offices in Milan and Rome.

- Other interactive vendors include INFONET (owned by GEDA), SIPE OPTIMATION, DATA AUTOMATION, and SICIT. Other remote batch vendors include AUSELDA and ITALSPED in addition to the above.

- Italian banks have dual role in Italy's services industry: a) they own several large services vendors and, through them control 15% of the available Italian market; b) bank computer centres, companies or consortia (mainly small and medium size banks) provide an important part of the computer services for the banking sector.

- Services companies are mainly (70%) located in the North of Italy, particularly in Lombardy (36%), Piedmont (12%) and Vaneto (10%). Only 10% of the services vendors population is in or around Rome.

- Despite repeated difficulties of establishing a viable network of public switch lines, Italy has nevertheless developed an underlying demand for RCS services which is spread among very few vendors. As a result, each sees its market expanding rapidly.

- With the high concentration of business north of the Genoa/Bologna line, serving the larger part of the market is not too costly from any one of a dozen cities. The added attraction of the north is that the congestion of Rome (the administrative and political centre) is avoided.

- Politically and socially, Italy continues to be unstable. The market is nevertheless the fourth largest in Western Europe - an attraction not to be overlooked.

(ii) SWITZERLAND

- The Swiss market is valued at $80M and is one of the smallest in Western Europe.
- The main RCS competitors are listed in Exhibit III-H.2.

(iii) AUSTRIA

- Austria is a relatively small market in both geographic and value size. The market is valued at $60M in 1978.
- The main participants in the Austrian market offering RCS services are listed in Exhibit III-H.3.
- Three of the largest RCS companies are American owned, namely CDC, GEIS and AC Service (UCC).
- The Austrian market has not been encouraging for RCS vendors until recently since the PTT has not offered equipment and services tailored for data transmission.

THE TOP REMOTE COMPUTING SERVICES VENDORS IN SWITZERLAND 1978

RCS RANK	COMPANY	RCS SERVICES ($ MILLION)			ALL SERVICES TOTAL ($M)
		REMOTE BATCH	INTERACTIVE	TOTAL	
1	CDC	13.5 *	1.5 *	15.0 *	17.6 *
2	FIDES	4.6 *	2.0 *	6.6	14.0 *
3	IHA	1.4	-	1.4	7.0
4	INTERDATA	0.6	0.4	1.0	12.4
5	GEIS	-	1.0 *	1.0 *	1.0 *
6	DATRON A.G.	0.8	0.17	0.97	4.2
7	PROGNOS A.G.	-	0.5	0.5	5.9
8	TELECOMCENTRE	-	0.36	0.36	1.8
9	ELDATOR A.G.	-	0.28	0.28	0.7
10	HOWEG DATA A.G.	0.02	0.11	0.13	1.0

SOURCE: INPUT CAMP/EUROPE 1979

NOTE:

* INPUT ESTIMATE

\+ SMALL VALUE

CAPTIVE REVENUES WHERE KNOWN ARE OMITTED.

EXHIBIT III-H.2

THE TOP REMOTE COMPUTING SERVICES VENDORS IN AUSTRIA 1978

RCS RANK	COMPANY	RCS SERVICES ($ MILLION)			ALL SERVICES TOTAL ($M)
		REMOTE BATCH	INTERACTIVE	TOTAL	
1	CDC	4.0 *	0.4 *	4.4 *	6.29 *
2	GEIS	+	0.7 *	0.7 *	0.7 *
3	GREGOR	-	0.4	0.4	2.1
4	VORARLBERGER R.Z.	0.03	0.1	0.12	3.15 *
5	AC SERVICE	1.7 *	+	1.7 *	4.3

SOURCE: INPUT CAMP/EUROPE 1979

NOTE:

* INPUT ESTIMATE

\+ SMALL VALUE

CAPTIVE REVENUES WHERE KNOWN ARE OMITTED.

EXHIBIT III-H.3

IV. MARKET DRIVING FORCES

IV. MARKET DRIVING FORCES

A. DEVELOPMENTS IN HARDWARE AND SOFTWARE

- The impact of mini computers is clearly beginning to influence the users' approach to the structure and source of their computer services. De-centralisation is a trend which has been made possible by mini computers; the aspect of de-centralisation which is not yet established in the minds of users is what options are available and what form each will take. Two broad approaches being initiated currently are:

  - Distributed Data Processing (DDP)
  - User Site Hardware Services (USHS)

- Growth rates for DDP in the major European countries range from 25% to 40% annually over the next 2 years. The corresponding growth rate for centralised computing is 15% to 20%; it is probably fair to assume that some centralised growth is to support increasing distributed systems.

- For 10 mainframes or other centralised hardware configurations in large organisations there are currently between 1 and 5 (depending on the country) distributed or dedicated computers.

- Between 20% and 18% of large organisation users who currently use conventional external services envisage the use of USHS.

- DDP and USHS are only two forms of de-centralisation currently available. Other modes of supply may be possible and there are no doubt many more variations possible on the two existing themes. As the number of services within RCS increases the boundaries between them will become less distinct. Names and labels for services will increasingly become a marketing concept.

- Services companies are becoming increasingly hardware orientated; the best example of this trend is the turnkey system which usually involves the systems or software house to be a supplier and installer of hardware. Recent acquisitions by service bureaux of software houses (e.g. BOC/Software Sciences) indicate that the Turnkey System is seen as a recovery vehicle for batch customers and a new delivery vehicle for USHS.

- A further factor in the increasing hardware orientation of services companies is the increasing dependence of hardware manufacturers on these companies for production of application software to meet users' needs. DEC does more than 75% of its business in the UK through its OEM and Discount agreements with service companies.

- IBM pursued a large number of major software houses after the announcement of S/1 to examine the prospects for co-operation. At the time the lack of discount was a discouraging factor which has since been to a certain extent relieved. Meanwhile several systems/software houses in the UK (e.g. Scicon, Logica and CAP) have installed S/1 machines in their offices for development work.

- Now that the IBM 4300 has been announced there will be further increased vendor and user pressure in service companies to include the new range in their services. The types of products and services, some including hardware supply to the end user, which could be supplied by RCS vendors are:

  - Facilities Management
  - 370 Off Load to Remote User Sites
  - On Site Cluster Systems
  - Large Scale Turnkey
  - Application Software Products/Services

- The focal point of competition within the services industry is the rivalry between turnkey systems and the closest external computing service to meet the user requirement. Service bureaux have long feared the impact of the mini computer and the answers which are emerging to meet this threat are mostly based on an alternative form of supply of mini system.

(i) IMPACT OF NEW IBM ANNOUNCEMENTS

- The mainframe population is of course constantly changing. The most surprising feature of the installed base at the moment is perhaps the fact that 22% of the installed base is still 360 series equipment. Also, there is a large number of small machines (e.g. IBM System 32, System 34, System 3) installed in Bureaux.

- IBM has moved on to a whole new price performance curve with its 4300 series equipment, which at the top end (4341) could damage prospects for the 303X series if sold in multiple configurations at central sites.

- The 4331 has a reported MIP rate of up to 1.3 times the 370/135. It therefore replaces and obsoletes the 370 models 115-2 and 125-2 and their earlier versions.

- The 4341 has a quoted MIP rate of 1.7 times that of the 370/148. It has some three times the power of the 370/138 which it therefore obsoletes together with the 370/148.

- The 4300 Series aims to consolidate further IBM's move towards fixed disc technology. The two main products for the 4300 Series are:-

  - 3310 with 64.5 Mb (4331 only)
  - 3370 with 570 Mb (4331 and 4341)

- First shipments of the 4341 are due in the first quarter of 1980.

- Of the PCM suppliers, only Itel and Amdahl are of real significance in the U.K.

- Amdahl machines are above the 4300 Series in power and therefore not likely to be impacted significantly by it. Amdahl must fight it out with IBM in the 303X market.

- Itel are in a relatively strong position to resist the 4300 series challenge by IBM because:

  - the business is not entirely dependent on PCM sales

  - its chief strength as a PCM lies just above the 4341 level i.e. in the 'hole' between it and the vulnerable 3031.

  - its policy of offering a complete system permits a full comparison with IBM's all in prices (including software and support.)

- IBM's prices for its new 64k chip memory on the 4300 series are $20,000 per megabyte. This price drop will severely hit several of the less well known PCM's (Magnuson, National Semiconductor, Two Pi, IPL Systems, Cambridge Memories, Nanodata, Kardios, Citel).

- The IBM 8100 series leaves off where the IBM 4331 begins and is limited to a memory size of $\frac{1}{2}$ Mb. This product is not likely to be of much significance to the Bureau market except as a replacement for IBM 3790 communications processors and special purpose data entry systems.

- The IBM Series 1 minicomputer has been a great disappointment so far to the software houses who have found it difficult to use due to the poor quality of its basic software. It has also been supported totally inadequately in Europe.

- The new 8100 being marketed by DPD and overlapping the Series 1 in price and capability is likely to be used in preference to the Series 1 for remote intelligent on-site processors, where significant mainframe access and processing is needed. IBM's integrated DPD marketing of 8100's and mainframes together with their present technical support strength will combine to keep IBM's GSD people at arm's length from users unless and until the Series 1 becomes popular as a distributed processing system in its own right.

- The IBM System 38 is the next logical machine choice for the large number of System 3, 32 and 34 based Bureaux. A number of Bureaux said that this was their next intended machine.

- The price per MIP on the 4300 series is 40 to 50% lower than on the 3030 series machines and this is causing many uncommitted 3030 series prospects with large IBM mainframes to re-think their plans. The problem however is that while the 3030 series equipment is available now, the model 4341 will not be available until 1980 for most potential customers.

- Amdahl and Itel are well placed to displace successfully a number of large 370's, in the next two years into early 1981. This may well result in large second user 370 series machines going into the medium end of the Bureau market who will be looking for the most cost effective hardware deals available.

- IBM continue to be vulnerable due to long delivery times and their policy of refusing to quote delivery dates with orders.

- The top end of IBM's new product line, the H series, is not likely to become significantly available until 1982.

B. PRICING

(i) U.K.

- In the U.K. RCS market, pricing tends to be set by GEISCO who prices its services at a premium to the other suppliers in the market.

- Until recently, market price changes have followed a pattern. GEISCO modifies its prices, followed one month later by COMSHARE, and by ADP Network Services six months later. IBM has not had appreciable influence to date.

- In 1977 this pattern was broken. GEISCO (then Honeywell) raised its prices, but its closest rival, COMSHARE, did not. ADP also kept prices unchanged.

- Competitor's evaluation of each other's pricing usually carried out by buying time on each other's systems and running company benchmarks.

- The market is very price sensitive and, as a result, the vendors tend to move in parallel.

(ii) FRANCE

- During 1979, INPUT carried out a series of benchmarks of major computer services vendors in France using basic function packages such as compilers and sorts. From the outset it should be realised that such benchmarks provide a partial view only of the French market pricing structure.

- The absence of any computer services industry leader with a dominant position, (equivalent to IBM in the computer equipment industry), means that there are no pricing standards by which to judge the "market level" of a given user service.

- Basically, vendors charge what they want, within reason, for non-standard (or specific) applications. Only in machine time sales is there a semblance of the "going rate" (e.g. for an hour of machine time).

- Whereas for specific applications the variance is towards how high the vendor can raise charges before disturbing the client, raw time sales tend to be an area of highly competitive discounting of machine time that has been amortized on other activities.

- However, some vendors refuse to enter into price cutting for activities they are not interested in. GSI, for example, has no interest in time sales, (such as for the benchmarks that were run) and was not very concerned about the level of price charged by others for the same job. As a result, some of the GSI prices are very high, which is not a true reflection of GSI's competitiveness in the French computer services market.

- In France, pricing for Computer Services has little to do with performance. In general, bureaux charge widely varying prices for identical services, with little to fear from customer back-lash.

- Thus Computer Services vendors, as a rule, charge customers at a level compatible with their status in the market. The more important the status the higher the price that can be charged. This is evidenced by the appearance of the GSI, IBM, CISI group near the top of all price comparisons; prices quoted varied by as much as 4.6 to 1 for Fortran compilation between the highest and lowest prices.

- It is a matter of company policy as to when pricing changes occur for a given service but it is probable that a 10%-15% increase could be made, without any noticeable impact on the customer base.

- There are some interesting anomalies that were raised by the benchmarks, not least of which is the realisation that prices can vary, for an identical job, despite the fact that the same model/make of machine, version of operating system, version of assembler etc., are used.

- The principles of pricing and discounting vary very considerably from one supplier to another although most of the IBM-based vendors use the same basic method to determine a basic "Unit of Charge". However once a unit of charge has been derived, different rates are applied for:

  - different machines
  - different levels of daytime/nighttime priority of turnaround.

- Not all bureaux operate a variable charging system. Telsys and Franlab, for example, have one basic rate of charge regardless of what turnaround constraints exist. For those companies which modulate the tariff according to priority, the tariff increases by a factor of up to 2 with respect to the normal rate.

- Discounting information is extremely difficult to obtain in view of the commercial significance attached to such information. Most firms do not give hard information before discussing service needs in considerable detail and like to operate on a customer by customer basis. However, discounts for business volumes in excess of 1MF of sales per annum can be between 20 and 40 percent.

C. DATA COMMUNICATIONS

(i) U.K.

Services Provided

- The main data transmission service offered by the Post Office is Datel. The service is offered over the public switched telephone network (PSTN) and private circuits (leased lines); maintenance of any necessary modems and ancillary control equipment is also available to interface customers' data terminal equipment to Post Office circuits. Transmission rates vary from 200 bits/sec to 50K bits/sec; the latter speed is provided over specially engineered circuits giving a full duplex facility.

- For computer bureaux and other organisations which need to link a larger number of customers via a common line to his facility, the Post Office provides Dataplex 3. This service comprises two multiplexers interconnected via modems to a private common circuit; customers access the remote multiplexer using private circuits or PSTN. Lower costs are thereby achieved since the common line is being shared and the local multiplexer is being accessed at local call charges.

- The Post Office has been experimenting with packet switching and has been operating an Experimental Packet Switched Service (EPSS) since April 1977. The service has been available between 0845 hours and 1645 hours on weekdays; a network availability of 99% has been achieved during these hours. It is planned to introduce a public Packet Switching Service (PSS) during the latter part of 1979; this will meet international standards CCITT x 25, x 3, x 28 and x 29. EPSS will be maintained for a reasonable overlap period.

- International data transmission is provided through the following services:

  - Datel for use on PSTN providing speeds ranging from 50 bits/sec to 2400 bits/sec. Connection with most European countries and the USA and Canada is available.

  - Leased circuits using telephone or telegraph type circuits are available providing speeds up to 1200 bits/sec. For higher speeds telephone circuits can be grouped and provide up to 50K bits/sec; between the UK and the USA up to 50K bits/sec can be provided using single channel per carrier facilities. The transmission is digital in the space link but it is necessary to change to analogue techniques for the terrestrial links.

  - For connection with Canada a point to point facility is available between the UK and the Montreal International Gateway: Speeds ranging from 50 bits/sec to 2400 bits/sec are available on full duplex operation.

  - An International Packet Switched Service (IPSS) is planned, initially between the UK and the USA. The first host-to-host link has been set up between the London and Boston IPSS gateway nodes. The link operates at 2400 bits/sec and is accessed in the UK from the Post Office R & D centre at Bedford.

  - Euronet was due to be available to UK users in late 1979; access is gained to this information network through a packet switching exchange in London. Speeds up to 96K bits/sec will be available.

PSTN CHARGES IN THE UNITED KINGDOM

a) CONNECTION CHARGES

- INSTALLATION OF A NEW LINE WITHIN 5 km OF AN EXCHANGE WHERE EXTERNAL WIRING REQUIRED - £45
- ANNUAL LINE RENTAL - £36 to £39

b) TRAFFIC CHARGES

DISTANCE (km)	CHARGE/HR (£)		
	PEAK	STANDARD	CHEAP
LOCAL	0.90	0.60	0.15
56 km	3.60	2.40	0.60
56 km	10.80	7.20	1.80

NOTES i) PEAK RATE - MON TO FRI, 0900 - 1300
ii) STANDARD RATE - MON TO FRI, 0800 - 0900, 1300 - 1800
iii) LOCAL CALLS VARY IN RADIUS

EXHIBIT IV-C.1 (a)

UNITED KINGDOM LEASED LINE CHARGES

DISTANCE (km)	CONNECTION CHARGE (£)		ANNUAL RENTAL (£)	
	S1/S2/S3	T	S3	T
0.8	15	20	32 - 74	34 - 85
0.8 - 16	25	40	85 - 405	103 - 445
16 - 80	35	60	600 - 1185	610 - 1295
80 - 160	55	90	1280 - 1815	1440 - 2055
160	75	120	2210 - 3620	2410 - 3890

NOTE:
i) S1, S2, S3 AND T ARE LINE QUALITY INDICATORS
ii) S3 IS USUALLY 4 WIRD; T IS ALWAYS 4 WIRE
iii) S3 CAN CARRY UP TO 1200 BITS/SEC
iv) T IS REQUIRED FOR MORE THAN 2400 BITS/SEC

EXHIBIT IV-C.1 (b)

Tariffs

- While Public Switched Telephone Network (PSTN) lines are relatively costly, leased lines are very cheap and of good quality.

- U.K. networks using PSTN lines have a critical cost breakpoint at 56 kilometres above which line costs are tripled. (See Exhibit IV-C.1 (a)).

- Leased T quality circuit connection charges are from 33% (short distance) to 60% (long distance) more expensive that S3 charges. The circuits themselves are from 2% to 20% more expensive than S3 circuits. (See Exhibit IV-C.1 (b)).

- Average delay for obtaining leased line installation is three to four months.

- The Post Office announced in 1978 a ten year plan to increase telephone penetration from today's 45% (telephone per person) to 80%. Neither Sweden nor the U.S., who have the highest penetrations rates (70-75%), attain that rate today.

- The U.K. Post Office telecommunications group has the largest budget among the Western European telecommunications authorities, spending nearly $2 billion a year (or $5.6 million a day) on improvements and network extensions. Its electronic exchange (System X) now under development will nevertheless arrive later that the Swedish, German, and French equivalents.

(ii) FRANCE

Services Provided

- Conventional circuit switched data transmission is provided entirely on the publicly available lines; no leased lines for exclusive use are available.

- For speeds up to 2400 bits/sec the Public Switched Telephone Network is used; the quality cannot be consistently guaranteed due to the variety of equipment which services that network and the variety of routes which may be selected. All subscriber installations consist of a telephone to establish communication.

- For speeds between 2400 bits/sec and 9600 bits/sec the Caducee service is available; this is a specially engineered network offering a higher quality service and is provided specifically for data transmission.

- Telex circuits are an alternative to the PSTN for very low speeds; the cost of transmission at 300 bits/sec for distances over 200 km and between 100 and 200 km for long datastreams favour the Telex service.

- For more intensive users and those with multi-point data transmission requirements two network based services are available. The networks consist of multiplexors connected by special high grade links. Users are connected to the nearest node of the network by the PSTN, leased line or the network can be extended to place a multiplexor on the user's site; the type of connection depends on the service selected:

  - The Transplex service is provided for speeds up to 1200 bits/sec and operates in asynchronous duplex mode. Connections on the terminal side can be made through PSTN or a leased line; on the computer side, the connection can be made by leased line to the nearest network node, or, the network can be extended to place a nodal multiplexor in the computer installation.

  - The Transmic service is a high speed service reserved for data transmission. Speeds ranging between 2400 bits/sec and 2M bits/sec are available operating in duplex synchronous mode. Connections with the network are made through special very high speed links or on-site multiplexors.

PSTN CHARGES IN FRANCE

a) CONNECTION CHARGES

- ANNUAL RENTAL FOR CONNECTION TO PSTN - 378 FF to 504 FF

b) TRAFFIC CHARGES

DISTANCE (km)	CHARGE (FF)
10	0.42/CALL
10 - 25	21.0
25 - 50	33.6
50 - 100	63.0
100 - 200	100.8
200	126.0

NOTE: i) A REDUCTION OF 50% IS APPLIED OUTSIDE PEAK HOURS

EXHIBIT IV-C.2 (a)

- The French have been at the forefront of European development of packet switching networks, particularly with the prototype RCP and CIGALE networks. These are the forerunners from which the present TRANSPAC public network is derived. The service is yet to be fully implemented to provide access from all parts of the country. Transmission speeds range from 50 to 4800 bits/sec. Connections with the nearest access node can be made through Telex, PSTN or leased circuits; the virtual circuits in the network can be automatically switched according to network load or on a permanently fixed path between two points.

- International data transmission connections are available through three types of service:

  - The Datel services, provided in partnership with the British Post Office, are available to connect with most European countries and the USA and Canada. The speeds available range from 50 bits/sec to 2400 bits/sec.

  - An access service, called DBS, is available to US subscribers to Tymnet and Telenet. Currently a transmission speed of 300 bits/sec is allowed.

  - The Sesame service provides the option to users of building up a private message switching network. The system offers speeds ranging from 50 to 1200 bits/sec.

Tariffs

- French PSTN line costs are expensive compared with the European average, as shown in Exhibit IV-C.2 (a). The quality of the lines does not compare well, however, nor does the average delay in obtaining lines (although this has vastly improved, halving in the last two years to today's average of ten weeks).

- PSTN connection costs are very high at the short distance end and also entail a monthly rental. As the distance grows to 150km or more, the charge becomes more comparable to other major European countries.

LEASED LINE CHARGES IN FRANCE

DISTANCE (km)	ANNUAL RENTAL ('000 FF)		
	2 WIRE	4 WIRE QN	4 WIRE QS
1	2.06	4.07	6.68
5	3.73	7.46	8.21
10	5.85	11.69	12.86
20	10.08	18.75	20.62
30	12.90	25.80	28.39
50	19.96	32.86	36.85
250	85.68	98.58	115.72

EXHIBIT IV-C.2 (b)

- Leased lines are the second most expensive in Europe (see Exhibit IV-C.2 (b)) and by such a margin that one wonders how they can be justified in the eyes of the PTT, let alone the users.

- When the same company uses both ends of the leased line (i.e., when the leased line is used for intercompany or intra-subsidiary communications) a 20% reduction is applied. The formulae used is directly dependent on straight line distance, such that there is a continuous variation of tariff between the tariff zones (kilometres 1, 2, 10, 20, 30, 50, 100, 200, 250, 300 and 311).

- At the top end (311km) the French tariff is more expensive than even the German tariff. Fortunately, most RCS business is done in and around Paris; where communications are necessary between Paris and Marseille there are alternatives, the most important of which is Transplex.

- Transplex (from Telesystemes) is practically a value added network which offers a data highway between Paris and Marseille with network collection points in all of the major cities in the North, West, Southwest, and South. The tariff is some 25-30% cheaper for equivalent or better services than those of the PTT. Yet Telesystemes is owned by France Cables, which is owned by the PTT.

(iii) WEST GERMANY

Services

- Two alternatives utilising the public networks of the Deutsche Bundespost are available as discrete data transmission services:

  - The telephone (PSTN) and telex networks are used to provide a speed range of 20 bits/sec up to 4800 bits/sec. Since these networks were set up originally for transmission of voice-grade and teletype messages they are subject to some constraints on quality.

- The Datex network was established especially for the transmission of data and provides high grade lines for operating speeds ranging from 200 bits/sec to 48,000 bits/sec. All but the 300 bits/sec service operate in full duplex mode. The Datex network employs for the higher speeds, eletronic circuit switching and a 9600 bits/sec speed will soon be available.

- To satisfy user needs for dedicated circuits connections are allowed using PSTN or leased lines. Telephone type circuits are used, although, interconnection with the standard PSTN network is not allowed if the circuit is leased. In the latter case connections are only allowed between persons of the same legal entity. By introducing electronic circuit switching the Deutsche Bundespost is establishing an integrated telex and data network; the routing of fixed and leased circuits will gradually be absorbed by this new network.

- The Datex network for packet switching will be available in 1980.

- For international connection German users have:

  - Access to a similar range of countries to those offered by France and the UK with Datel; PSTN lines are used for this purpose also.
  - Datex is available only to Belgium and France (at 20 and 300 bits/sec).
  - Leased lines are not normally offered but can be obtained under certain conditions.

Tariffs

- The quality of the German PTT network services is the best in Western Europe and is continually being improved. Quality is expressed as measuring the reliability of the lines provided, speed of support for installation modification, line capacity available for expansion and short delay in obtaining it.

PSTN CHARGES IN GERMANY

a) CONNECTION CHARGES

- o INSTALLATION OF ONE LINE - 200 DM (TWO WIRE)
  - 400 DM (FOUR WIRE)
- o RENTAL FOR ONE LINE/YEAR - 324 DM

b) TRAFFIC CHARGES

DISTANCE (km)	CHARGE/HR (DM)					
	PEAK		STANDARD		CHEAP	
	TEL	DATEX	TEL	DATEX	TEL	DATEX
LOCAL	0.23	-	0.23	-	0.23	-
DISTRICT	1.73	-	1.73	-	1.73	-
WITHIN ZONE	9.20	-	9.20	-	9.20	-
OUTSIZE ZONE 25	18.40	16.25	12.27	10.85	12.27	10.85
25 - 50	27.60	27.05	18.60	16.25	12.27	10.85
51 - 100	55.20	48.65	27.60	24.17	12.27	10.85
100	69.00	66.85	36.80	34.61	12.27	10.85

NOTE:
(i) PEAK RATE - 0600 TO 1800, MON - FRI; 0600 TO 1600, SAT

(ii) STANDARD RATE - 1800 TO 2200, MON - FRI

(iii) CHECK RATE - 2200 TO 0600 MON - SUN; 1400 TO 2200 SAT; 0600 TO 2200 SUN

(iv) DATEX CHANGES ARE FOR 2400 BITS/SEC

EXHIBIT IV-C.3 (a)

LEASED LINE CHARGES IN GERMANY

a) INSTALLATION CHARGES

- o WITHIN SAME LOCAL TELEPHONE AREA: 2 WIRE - 200 DM; 4 WIRE - 400 DM
- o BETWEEN DIFFERENT TELEPHONE AREAS: 2 WIRE - 400 DM; 4 WIRE - 800 DM

b) RENTAL

DISTANCE (km)	CHARGE/YR ('000 DM)
	WIDEBAND CIRCUITS UP TO 48 K Hz
5	12
10	24
50	72
250	105
DISTANCE (km)	CHARGE/YR ('000 DM)
	TELEPNONE CIRCUITS UP TO 3400 Hz
5	2.4
10	4.8
50	24.0
100	31.2
250	36.0

EXHIBIT IV-C.3 (b)

- It is estimated that the German PSTN is, on average, never loaded beyond 80% capacity. The result is that dialled connections always get through (unless the number dialled is busy).

- The importance, to a businessman, of this feeling of "communicability" cannot be overstressed. One only has to try to do business in Italy (where the lines between major cities are always saturated during normal working hours) to fully understand the value of good communications. The frustration caused by faulty communication is bad enough, but not being able to "get through" at all has a disastrous effect on business morale.

- Unfortunately, this very high quality and availability of German communications has a stiff price. PSTN line costs are almost twice as expensive as the next most expensive peak rates in France and Norway.

- The cheaper PSTN connections are those that use lines that are greater than 100 km long (the longer the line, the better the relative cheapness). (See Exhibit IV-C.3 (a)).

- The leased lines tariff is graduated similarly, but changes reduce more steeply with increasing distance (see Exhibit IV-C.3 (b)). Overall the leased line rates in Germany are the most expensive in Europe, and by a large margin.

- Connection charges are composed of two elements: Cost of the first installation and its rental thereafter. This can be quite expensive for a multipoint connection and very expensive for complex networks.

(iv) BELGIUM/LUXEMBOURG

- Although the markets of Belgium and Luxembourg are often considered together, the data transmission services offered are supplied by independant PTT's.

PSTN CHARGES IN BELGIUM/LUXEMBOURG

a) CONNECTION CHARGES

		BELGIUM	LUXEMBOURG
o	LINE INSTALLATION -	4,700 B Fr	2,500 L Fr
o	LINE ANNUAL RENTAL -	9,720-16,560 B Fr	5,400-9,600 L Fr

b) TRAFFIC CHARGES

DISTANCE (km)	CHARGE/YR (B Fr OR L Fr)	
	BELGIUM	LUXEMBOURG
LOCAL	5.00	3
SHORT TRUNK	93.75	
MEDIUM TRUNK	187.50	60
LONG TRUNK	375.00	

EXHIBIT IV-C.4 (a)

LEASED LINE CHARGES IN BELGIUM

a) INSTALLATION

- MINIMUM CHARGE FOR 4 WIRE - 5000 BF

b) RENTAL

DISTANCE	CHARGE/YR ('000 B Fr)	
	NORMAL QUALITY	HIGH QUALITY
LOCAL (SAY 5 km)	26.28-52.00	61.78-115.50
ADJACENT ZONES	97.50	150.00
NON-ADJ. ZONES	195.00	249.00

LEASED LINE CHARGES IN LUXEMBOURG

a) INSTALLATION

- STANDARD CHARGE FOR 4 WIRE CIRCUIT - 10,000 LF

b) RENTAL

DISTANCE	CHARGE/YR ('000 L Fr)
LOCAL	12.3
SAME SECTOR	49.8
DIFFERENT SECTOR	94.8

EXHIBIT IV-C.4 (b)

- PSTN and leased lines are available in both contries for speeds up to 2400 bits/sec; for higher speeds each country provides different services:

  - Speeds up to 9600 bits/sec are provided in Belgium on baseband for physical lines of short distance (up to 20km).

  - Speeds up to 9600 bits/sec are provided in Luxembourg with conventional telephone circuits. Speeds in excess of 9600 bits/sec are provided either by baseband or wideband; the latter have to be specially engineered and can provide speeds of 48K bits/sec and 72K bits/sec.

- Conventional telegraph and telephone circuits are available to connect internationally with countries offering compatible data transmission facilities (i.e. those which participate in International Datel). Connections are available through PSTN or leased circuits for speeds up to 2400 bits/sec. Connection with the Tymnet and Telenet networks are also available through a connecting node in Brussels.

- A packet switching service is planned for introduction in Belgium at the end of 1980. This will conform to internationally agreed standards, in particular the x 25 protocol. The system will be based on the 'virtual circuit' principal whereby all packets relating to one call follow the same route thus preserving the transmission sequence. Permanent virtual circuits will also be available to preserve the same route for all calls between two points. Access will be by PSTN or leased lines to the networks; network operating speeds will range from 2400 bits/sec to 9600 bits/sec.

Tariff

- Although PSTN line rental is the highest in Europe in these two countries, the peak rate changes are also the lowest. Conversely, leased line changes are relatively cheap. (See Exhibits IV-C.4 (a) and (b)).

(v) NETHERLANDS

- The current data transmission services available in the Netherlands are based for the bulk of user requirements on telegraph and telephone type circuits. The services are:

  - Dabas, a slow speed service covering up to 300 bits/sec and 1200 bits/sec; operating mode is asynchronous with half or full duplex options. The service is available on the PSTN or leased lines.

  - Datel provides for a range of speeds up to 4800 bits/sec; operating mode is asynchronous or synchronous and half or full duplex. The service is available only on PSTN circuits.

- For higher speed and quality, special arrangements must be made with the PTT; the options available are:

  - High quality up to the CCITT recommendation M1020
  - Wideband circuits to allow speeds up to 64k bits/sec.

- Medium speed services will be available as a standard service in mid-1979 through the Idee service. This service will provide for speeds between 2400 bits/sec and 9600 bits/sec; operating mode will be synchronous and full duplex. Idee is being specially introduced for users who do not generate sufficient traffic to justify a leased line or need a back up facility for existing leased lines.

- A packet switching network is planned for the end of 1980. The service, called Datanet 1, will comprise:

  - 3 packet switching exchanges located in Amsterdam, The Hague and Arnhem
  - 57 remote concentrators
  - 1 network control centre.

  Customers will be connected to the network by 4 wire leased lines. Network speeds available will be 2400, 4800, 9600 and 48k bits/second.

PSTN CHARGES IN THE NETHERLANDS

a) CONNECTION CHARGES

- o INSTALLATION OF ONE LINE - 210 Dfl
- o ANNUAL LINE RENTAL - 276 Dfl

b) TRAFFIC CHARGES

DISTANCE	CHARGE/HR (Dfl)
LOCAL	0.16 (PER CALL)
TRUNK (PEAK RATE	13.2
TRUNK (OFF PEAK)	6.6

EXHIBIT IV-C.5 (a)

LEASED LINE CHARGES IN THE NETHERLANDS

a) INSTALLATION

- o 2 WIRE - 165 Dfl
- o 4 WIRE - 330 Dfl

b) RENTAL

	CHARGE/YR (Dfl)		
DISTANCE (km)	2 WIRE	3 WIRE	QUALITY 4 WIRE
LOCAL	210-450	420-900	840-1800
10	2100	2520	3690
11 - 25	3000	3600	5040
26 - 50	4800	5760	7200
51 - 100	6000	7200	8640
100	6600	7920	9360

NOTE:
i) CHARGES APPLY TO THE DABAS SERVICE

ii) WIDEBAND CHARGE ARE: INSTALLATION, 2,660 Dfl ANNUAL RENTAL, 5,000-50,000 Dfl

iii) NORMAL QUALITY LINES ARE TO CCITT SPECIFICATION M1040; "WUALITY 4 WIRE" LINES ARE TO M1020

EXHIBIT IV-C.5 (b)

- The Dabas and Datel services are internationally available and connect with all other contributing countries to the International Datel service. Idee will not be available internationally, excepting to the USA.

- Datanet 1 will not be internationally available in its first phase; at a later stage however this network will become the link with Euronet and other packet switching systems elsewhere.

Tariffs

- PSTN charges (see Exhibit IV-C.5 (a)) are among the cheapest in Europe and one of excellent quality.

- Leased line charges (see Exhibit IV-C.5 (b)) are also at the lower end of the European range for both installation and annual rental.

- A typical line change between London and the Netherlands is 120K Guilders/year.

(vi) SWEDEN/NORWAY

- Data transmission services presently offered in Sweden and Norway are similar in scope and both use PSTN or private leased circuits.

  - Using the PSTN, speeds ranging from 200 bits/sec to 2400 bits/sec are available, full duplex mode is provided for all speeds, half duplex being available in all mid range speeds.

  - Private leased lines are available to cover all the services provided in the PSTN system.

PSTN CHARGES IN SWEDEN/NORWAY

a) CONNECTION CHARGES

		SWEDEN	NORWAY
o	LINE INSTALLATION -	340 S Kr	1,000 N Kr
o	ANNUAL RENTAL -	200-272 S Kr	300-636 N Kr

b) TRAFFIC CHARGES

SWEDEN		NORWAY	
DISTANCE (km)	CHANGE/HR (S Kr)	DISTANCE (km)	CHARGE/HR (N Kr)
LOCAL	0.17	LOCAL	13.4
45	13.60	ZONE	27.0
45 90	25.50	50	67.0
90 180	40.80	50	121.0
180 270	51.00		
270	61.20		

NOTE: i) PSTN TARIFFS ARE STANDARD FOR ALL TIMES AND DAYS IN SWEDEN

(ii) CHARGES FOR NORWAY APPLY TO ALL TIMES AND DAYS EXCEPT LOCAL AND WITHIN ZONE CALLS WHICH ARE CHEAPER OUTSIDE PEAK HOURS

EXHIBIT IV-C.6 (a)

- Higher speed ranges, typically 2400 to 9600 bits/sec are provided using baseband modems which must operate on a short distance (up to 20 km) physical line. In Norway the service is referred to as DCB 9600 and includes a lower speed of 1200 bits/sec. In Sweden the Baseband service can provide a higher speed of 19,200 bits/sec also.

- Meanwhile a separate network intended specifically for data transmission is being established by the PTT's of Sweden, Norway, Finland and Denmark. The Nordic Public Data Network (NPDN) when available will provide full duplex four wire operating mode at speeds ranging from 600 bits/sec to 9600 bits/sec. The basic purpose will be to provide synchronous transmission although it will be possible to connect asynchronous data terminal equipment for lower transmission rates. Line quality standards will be higher than for the current PSTN circuits.

- A packet switching service is to be offered (probably at the end of 1981) by the introduction of the x 25 interface in NPDN. Additional network components will be necessary to handle the interleaved multiplexing of packets from different subscribers. Such additional components will include packet switching exchanges and separate packet multiplexors. Eventually the Nordic packet switching network will be able to communicate with the packet switching networks elsewhere, for example TRANSPAC, PSS and EURONET.

- The standard range of PSTN and leased line services for data transmission (up to 9600 bits/sec) are available for international connections where compatible services exist at the other end. Access to the Telenet and Tymnet US networks is available through a node in The Netherlands.

Tariffs

- Sweden is unique in Europe in that there is an independent supplier of communications lines and modems (Televerket), which has not only helped to keep the line costs down, but has also accelerated the speed of market penetration. As a result, the penetration rate (numbers of telephones per head of population) is comparable to that of the U.S. (70%).

LEASED LINE CHARGES IN SWEDEN/NORWAY

a) INSTALLATION

- FOR DISTANCES UP TO 6 km - 500 TO 700 S Kr; OVER 6 km - 900 S Kr

b) RENTAL

- IN NORWAY - 880 N.Kr.

DISTANCE (km)	CHARGE/YR ('000 SKr or NKr)		
	SWEDEN		NORWAY
	2 WIRE	4 WIRE	
6	UP TO 0.5	UP TO 1.0	1.80
6 - 10	1.0	2.0	3.60
11 - 20	1.8	2.8	3.58
21 - 30	3.0	4.0	7.62
31 - 40	4.8	5.8	9.60
41 - 60	7.2	8.2	12.60
61 - 80	9.6	10.6	15.60
81 - 100	9.6	10.6	18.60
101 - 120	12.0	13.0	21.60
121 - 150	15.6	16.6	25.02
151 - 200	19.2	20.2	30.00
201 - 250	26.4	27.4	35.04
251 - 300	30.0	31.0	40.02
301 - 400	42.0	43.0	67.04
401 - 600	50.0	51.0	55.02
600	50.0	51.0	66.00

NOTE: (i) TWO AND FOUR WIRE TARIFFS ARE THE SAME FOR LONG DISTANCE LINES IN NORWAY

(ii) IN NORWAY SURCHARGES ARE APPLIED FOR SPECIAL QUALITY (NKr 6000) AND DATA TRANSMISSION (NKr 4200)

EXHIBIT IV-C.6 (b)

- Data transmission costs in Sweden are among the cheapest in Europe. PSTN charges are cheaper even than those in the U.K. (See Exhibit IV-C.6 (a)).

- Although leased line rental is the second cheapest in Europe (after Luxembourg) the connect charges are the highest. (See Exhibit IV-C.6 (b)).

- In neighbouring Norway charges are in the middle of the European range.

(vii) DENMARK

- Transmission speeds available range from 50 bits/sec up to 48K bits/sec. These are provided as follows:

-	Telex network/leased circuits	-	50 bits/sec
-	Public Telephone Network	-	200 bits/sec to 2400 bits/sec
-	Leased circuits only	-	up to 48K bits/sec

- A packet switching services is planned for availability in 1981.

- International connections are possible using the telepnone and telex circuits. Access to U.S. certain databases is available via a concentrator in Amsterdam.

(viii) ITALY

- Transmission speads are available ranging from 200 bits/sec up to 240K bits/sec. These are provided as follows:

-	Public telephone network	200 bits/sec to 2400 bits/sec
-	Leased telephone circuits	200 bits/sec to 7200 bits/sec
-	Baseband	2400 bits/sec to 96K bits/sec
-	Wideband	48K bits/sec to 240K bits/sec.

- A packet switching service is planned for introduction in 1981; this will operate at 2400 bits/sec up to 48K bits/sec.

- For international connections the PSTN is interfaced with the International Datel network; private lines can be arranged to most locations in the world whether an international system is available or not.

(ix) SWITZERLAND

- Transmission speads ranging from 300 bits/sec up to 2400 bits/sec are available on PSTN or leased telephone lines. The Austrian PTT supplies modems for all operating speeds and modes. In the public network only 2 wire, and simplex or half duplex operation are available.

- Higher speeds are available with baseband facilities which extend the range to 9600 bits/sec.

- International calls are either dialled over the PSTN or booked with the operator for connection with the international Datel network. Also, connections with the Telenet and Tymnet networks in the U.S. are available through transatlantic lines supplied by Radio-Suisse Ltd.

- There are no plans for packet or message switching services; a link with EURONET is planned however.

(x) AUSTRIA

- Until recently the Austrian PTT did not offer services or equipment for data transmission. Consequently users procured their own equipment and after the necessary approvals had been obtained they were able to proceed. However a Siemens EDS exchange located in Vienna forms a starting point for modern data services; this exchange was due to be offering data transmission up to 300 bits/sec by mid-1979. The second exchange will be installed in Salzburg in 1980. The new EDS network will be connected to similar networks in Germany and Switzerland.

- Meanwhile transmission facilities are available over the telex, PSTN or private leased circuits. Speeds ranging from 50 bits/sec up to 240K bits/sec, as follows:

  - Public Telex, up to 50 bits/sec, half duplex,
  - Telegraph, up to 200 bits/sec, half of full duplex,
  - PSTN, up to 2400 bits/sec, half duplex,
  - Leased telephone circuits, up to 9600 bits/sec, half or full duplex,
  - Wideband, 48K or 240K bits/sec.

- International connections are available through the telex, PSTN or private leased telepnone circuits.

- The Australian PTT does not, and does not plan to, supply or maintain terminal equipment; provision of equipment and seeking the necessary approvals is the responsibility of the user.

- There are no plans for a packet or message switching system.

D. STAFFING: CHARACTERISTICS AND AVAILABILITY

(i) U.K.

- All employers complain of a shortage of staff - few are relieving the shortage by re-training from other disciplines or growing computer professionals from graduates. There is also a drift of U.K. trained people to the U.S. and to other parts of Europe.

- However, staff are available. The range of choice and eventual quality of staff engaged depends on what the prospective employer has to offer. Normally high salaries and good pricing benefits (car, company-paid private health insurance society membership, loan schemes etc.), create strong attraction in a recruitment campaign. Just as important is the nature of the challenge and the circumstances and location of the employer.

- Several channels exist for staff recruitment; these include:

  - recruitment agencies,
  - advertising,
  - head hunters, (direct approach through industry contacts),
  - recruitment events.

- A high proportion of computer staff are of good quality in the U.K. They are motivated by the challenge and working environment but have no particular allegiance to one employer, and movement between the less encouraging employers is quite frequent.

- Unionisation is a threat. Certain white collar unions (e.g. ASTMS, the Assosiation of Scientific and Technical Managerial Staff) have been recruiting hard. In the U.K. there is no legislation enforcing an organisation to allow its employees to belong to a union above or below any specific number of personnel. This does not vary from region to region - the second level of government in the U.K. has no legislative power; its purpose is administration only.

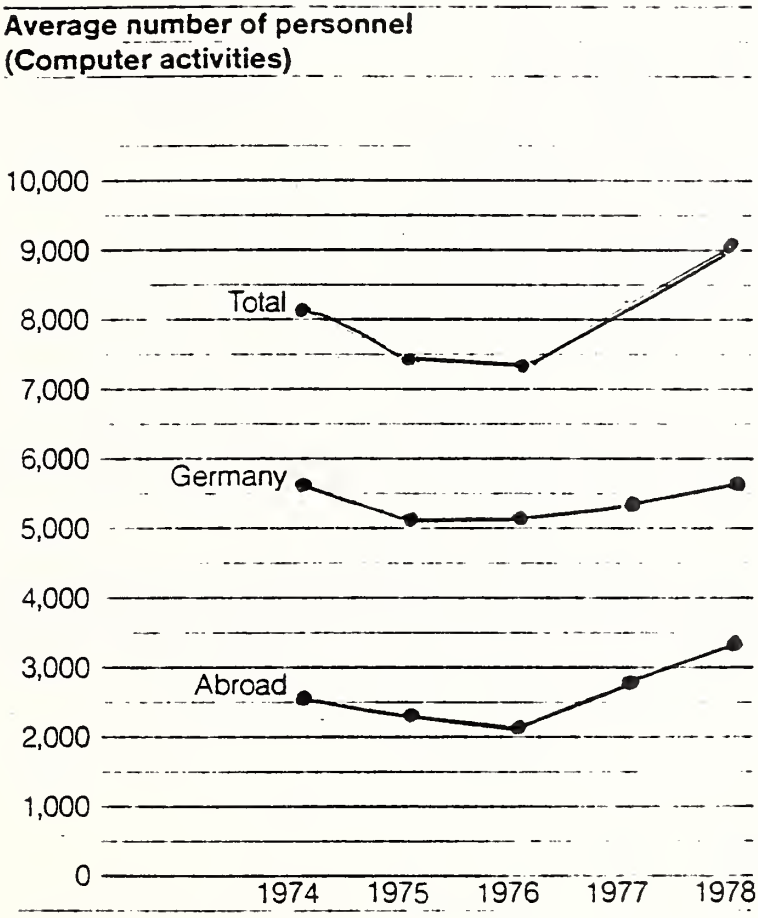
- According to the positions currently being advertised, average annual salaries in 1980 will be similar to those shown below:

-	Consultants	£11,500
-	Senior Analysts	£ 8,800
-	Analysts	£ 7,500
-	Chief Programmers	£ 7,000
-	Programmers	£ 6,000
-	Operation Supervisors	£ 5,800
-	Operators	£ 4,800.

- A source of strong competition for British skills in the computer field is other parts of Europe, such as the Netherlands, where salaries are twice as high and benefits greater. This is an even stronger situation since Great Britain joined the European Economic Community; nationals of EEC member countries can move freely within the EEC; there are few, if any, restrictions involved.

(ii) WEST GERMANY

- Nixdorf AG, a leading West German computer manufacturer, has some very clear ideas concerning employee relations. Firstly, they try to meet the need for more skilled workers by offering extensive training courses and apprenticeships for technicians and other jobs in industry, as well as in business and data processing management.



	1974	1975	1976	1977	1978
Total	8,219	7,424	7,303	8,288	9,150
Germany	5,684	5,049	5,174	5,419	5,775
Abroad	2,535	2,375	2,129	2,869	3,375

EXHIBIT IV-D.1

- It is a trend in West German industry today for employees to be able to select their own representatives to the Board. This and the following are offered by Nixdorf to both attract new staff and to maintain a creative and enjoyable efficient working environment and atmosphere:

  - performance-related pay,
  - -issue of employee shares (giving staff members direct participation in the success of the company,
  - opportunities for further training and education,
  - company pension scheme to supplement the state insurance.

- Nixdorf also recognises the importance of decentralised decision-making by delegating responsibility to division, department and branch level.

- Exhibit IV-D.1 shows the number of personnel active in the computer field in West Germany from 1974 to 1978 and how these figures compare to the rest of the world.

(iii) NETHERLANDS

- In common with the rest of Europe good quality experienced staff are in short supply; but the situation is improving and staff can be found within two months if appropriate compensation is being offered.

- Dutch staff are faithful to one employer if well treated, and don't like to change companies. They are generally unwilling to re-locate within Holland and are very resistant to moving their residence outside the country. For projects, batchelors are willing to move temporarily whereas married people will only work away form home for highly important or critical work. Nevertheless, the multi lingual capabilities of Dutch staff (many speak English plus French and/or German) make them a valuable asset in international operations.

DUTCH D.P. STAFF SALARY RANGES (1978) *

STAFF CATEGORY	RANGE ($ K per annum)
Operator (trainee - experienced)	7.5 - 22.0
Sen. Operator (shift ldrs - ops. mgrs.)	12.6 - 31.8
Programmers (trainee-experienced)	9.8 - 22.0
Sen. Programmers (senior/chief/prog. mgr.)	17.3 - 30.4
System Analysts/Senior Systems Analysts	14.9 - 25.7
Analyst/Programmers, Senior Anal. Progs.	19.6 - 31.8
Chief Systems Analyst/Systems Mgr.	21.5 - 36.4

EXHIBIT IV-D.2

- Staff recruitment through advertising is usually disappointing. Agencies are more effective but very expensive as are head hunters who are good for top people. The most effective way to recruit is by recommendation and individual contact by existing staff members with well thought of staff elsewhere (e.g. in competitive companies).

- The cost of labour in the Dutch computer staff market is comparable with the most expensive countries in Europe; only marginal differences exist between the cost of staff in Holland and Germany, France and the rest of Benelux. This high cost of labour results from the combined effect of:

  - high salaries (e.g. U.K. x 2).
  - employer social security contributions which are among the highest in Europe.

- The salary ranges given in Exhibit IV-D.2 are current and include additional payments to basic salary which are customary in Holland; these include holiday money, profit sharing, bonuses, overtime and irregular work compensation and travelling and car allowances.

- Administration of social security contributions is complex and each employer has to deal with two separate authorities, these being the Collector of Taxes (Belastingdienit) and a general administrative office (usually the GAK). The social security grouping (known as BV25) which would apply to many computer services staff requires the employer to contribute up to 26% of basic salary. A breakdown of contribution to each fund is given in Exhibit IV-D.3.

- All social security contributions are tax deductable unlike, for example, in the U.K. There is one exception to this rule - the employee's contribution to ZFW (health insurance).

SOCIAL SECURITY CONTRIBUTIONS

IN THE NETHERLANDS

Fund	Description	Contributions %		Total	Salary Limits (Guilders pa)
		Employer	Employee		
AOW	General old age pension act	-	10.4	10.4	38,800
AWW	General widows' and orphans' benefits act	-	1.5	1.5	"
AWBX	Exceptional medical expenses (compensation)	2.5	-	2.5	"
AKW	General family allowances act	0.8	-	0.8	"
KWL	Wage earners family allowances act	2.5	-	2.5	"
AAW	General disability act	1.9	-	1.9	"
ZW	Sickness benefits act	7.35 a	1.25 a	8.6 a	51,220
WAO	Disablement insurance act	6.05 *	3.65 *	9.7 *	"
WW	Unemployment insurance act	0.65 a	0.65 a	1.3 a	"
ZFW	Health insurance act	4.1 +	4.1 +	8.2 +	28,600
	TOTALS	25.85 a	21.55 a	47.40 a	

Notes:
- * After deduction of 14 Guilders per working day
- \+ Only in the case of fixed wages not exceeding 33650 Guilders p.a.
- a Average figure

EXHIBIT IV-D.3

- There are some useful concessions available to foreigners, for example:

  - Certain foreign employees may be entitled to a special 35% reduction of gross salary for tax and contribution calculation purposes for a maximum of 60 months.

  - Reciprocal arrangements exist between members of the EEC whereby as long as an employee continues to contribute in one of the member states his benefit status in his home state is deemed to have been continuous and without loss of vlaue.

(iv) U.S.A.

- New computer services companies are being formed, but there is a marked shift towards formation of software and professional services companies rather than the dominance of processing services companies which characterised the late 1960's.

- Several companies are projected to be over $500m per year in computer services by 1983. The process of industry consolidation will accelerate over the next three/four years.

- It therefore follows that the continued growth of the industry is dependent on attracting and retaining competent personnel.

  - Improved recruiting techniques are required, particularly to reduce the 30% and higher turnover rates which many vendors are experiencing with sales personnel.

  - Vendors must invest more in in-house training.

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